Notebook, Volume 8

This volume covers the periods July-August 1876 and January-February 1877. It is divided into two parts, each consisting of a series of soft-cover tablet notebooks. Part One contains nine notebooks, encompassing pages 1-256 and covering the period January-February 1877. Part Two contains four notebooks, encompassing pages 257-363 and covering the period July-August 1876.

The notes and drawings in Part One are primarily by Edison. Others are by James Adams and several were witnessed by Adams and Charles Batchelor. Most of the notes relate to etheric force investigations; experiments with ink and paper, including ink for the blind; and electrochemical experiments. There are also notes on electromotograph experiments; drawings of the autographic pen and press; and notes and drawings for the design of a mirror galvanometer. The last page of Part One refers to the speaking telegraph. Most of the experiments are chemical in nature and a number of pages appear to have been damaged by chemicals.

The notes and drawings in Part Two are primarily by Edison; others are by James Adams and Edward H. Johnson. They relate primarily to experiments in acoustic and multiplex telegraphy, the use of the electromotograph for telegraphic purposes, and experiments with batteries for sending telegraph messages by submarine cable. There are also notes and drawings of electrometers and galvanometers.

The notebooks are arranged in the following order:

Part One

1) "No. 1," pp. 1-36, January 11-12, 1877.

2) "No. 2," pp. 37-71, January 12-13, 1877.

3) "No. 3," pp. 72-107, January 13, 1877.

4) Unnumbered, continuation of "No. 3," pp. 108-125, January 14-16 and February 3-13, 1877.

5) "No. 4," pp. 126-160, January 17-21, 1877.

6) "No. 1 - Platina Solution," pp. 161-182, January 21-27 and February 14-15, 1877.

7) "No. 5," pp. 183-208, January 23, 1877.

8) Unnumbered, pp. 209-232, undated.

9) Unnumbered, pp. 233-256, February 2-14, 1877.

Part Two

1) pp. 257-280, August 2-6, 1876.

2) pp. 281-319, July 30-August 9, 1876.

3) pp. 323-334, August 3, 1876.

4) pp. 335-363, August 6-22, 1876.

Pages 320-322 are missing. These pages were used in October 1880 as exhibits in an interference proceeding involving Edison, Amos E. Dolbear, and George L. Anders. Photolithographs of the original drawings can be found in the U.S. Patent Office Interference Files, Box 1103, Record Group 241, Records of the Patent Office, National Archives and Records Service. Photocopies of these facsimiles have been microfilmed to complete the volume.

The following pages, containing only samples of duplicating ink, were not filmed: 218-229.

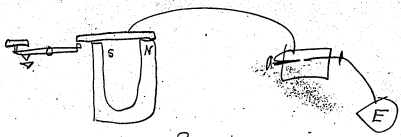
Blank pages not filmed: 70-71, 75, 121, 125.

Experimental
Notes

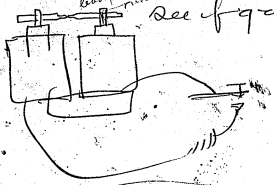
Thomas A. Edison

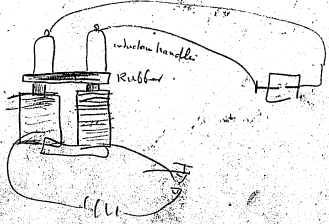
Jany 11 1907

Ether is

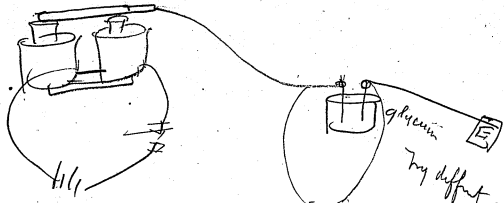


Various places





1



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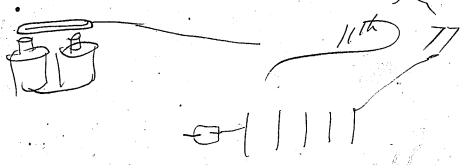
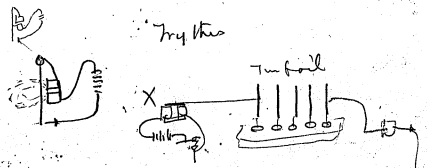
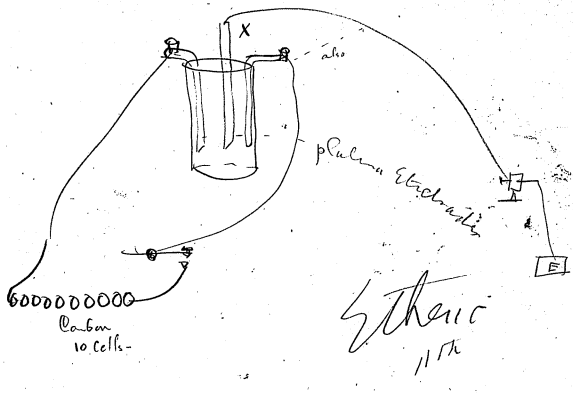




A X. try magnets of very high & low resistance with high & low R batteries to see if Ferson measure or the orientation by moving tinfoil plates.

2

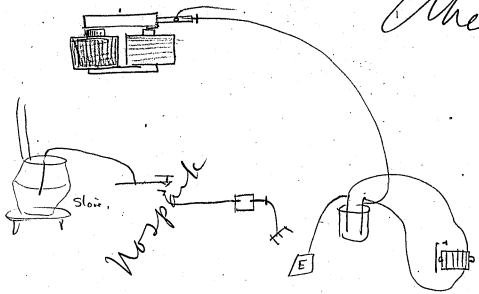


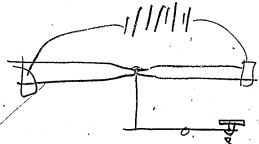
Etheric
11th

Place in the cell different solutions. moving X to one side or the other or taking it out altogether & connecting Etheriscope direct to one of the Electrodes.

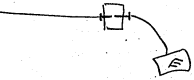
3

Etheric



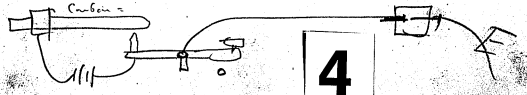


The Etheric Spark may be a molecular vibration set up in wire by Electric Spark.



Carbon powder Electric Light

Key brings wire into Light also.



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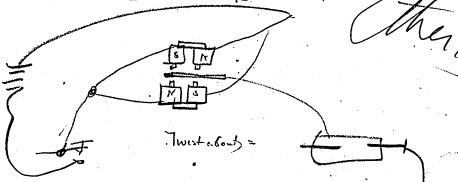
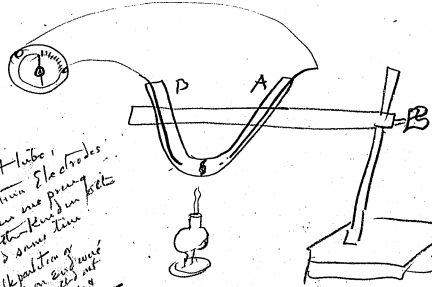
Etheric





Bent tube:
Platinum Electrodes
1 Sol on one prong
can other King on pole
powders show time
chalk partition or
opaque or diffusant
(Wheatstone's pulse net
Eng. Apparatus)

5

Johnson

Thos A Edison

Chas Batchelor

This page is a fair sample

James Adams

Mem

Nothing in it

Memphis

Hopefully yours

entered into this.

Chas Batchelor

Chas Batchelor

entered in in into

Chas Batchelor in into this tenth

Chas Batchelor

Now is the winter of our discontent

Now is James A Johnson

James

Now is the winter of our discontent made glorious

summer by this son of York

A Johnson

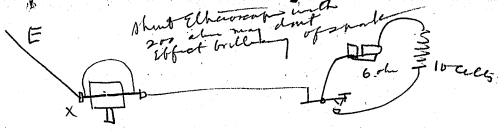
Now is the winter of our

James adams

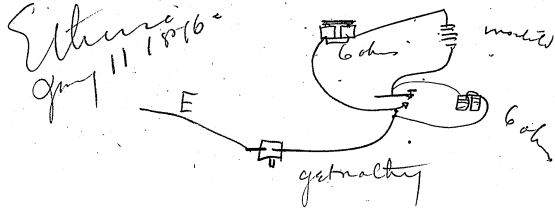
Chas Batchelor

Thos A Edison

6



get spark with stationary electrodes
when I put my hand at X,

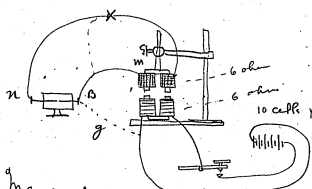


I have ~~noticed~~ noticed with the Carbon points, that no matter how powerful the spark is there must be a chain of Carbon particles touching Each other = If I separate the points a little distance and blow very hard on them, thus cleaning them of particles I cannot obtain the spark until I have brought points in

Contact and withdraw them, the spark is weak though I do not get it with full brilliancy until I have brought the points together & worked them so as to grind some of the carbon particles off - when considerable have been ground the points may be operated 1/32 of an inch apart the spark is weaker & uncertain but if a gentle blow is given the spark disappears & can not be made to appear until the points are again brought together

Also while sparks are passing between the two points, another set of points will give sparks also of equall brilliancy without diminishing those in the 1st points it is probable that 1/2 a doz or doz points might be made to give sparks.

8



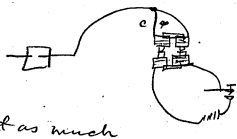
In contact get brilliant spark absent at point of the Etherscope. sparks gradually dies out until when inch away get it feeble. Proceeding get the shock is violent at the tongue when inserted in Coil at X. If now Magnet M be detached from the dark box & the dotted line wire g placed in Connection the spark is at once brilliant ~~almost~~ equal to that from M when it is laying on the Cores of the energized Magnet only separated by a piece of paper yet no shock can be perceived at g = the ground ~~[illegible]~~ was connected ~~[illegible]~~ from n with no great value after

9

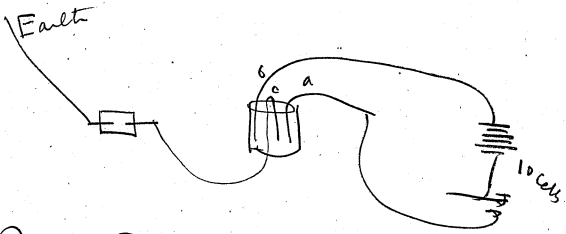
get just as much spark, whether

X wire is disconnected or connected
when M is much away

when M is in actual contact
with coils of other magnet,
& its two wires taken from dark
box & put together and a single
wire run to B. thus



get just as much
spark by disconnecting c get
same thing is when this
connected either from other
magnet =



Platinum Electrodes,
c Electrode being connected to the
Electroscope = by very fine manipulation
of point got several sparks
but that was during 1/2
hour manipulation =
Bichromate Potash in Cell 10 gm
in 100 cc H_2O = Warmed
c towards a, & b, consequent
on ~~whether~~ where c was when
got sparks =

11

8 gramme Sal
No 2. Borate of Soda in Cell,
Couldnt get a spark
10 minutes manipulation

40 gramme Sal
Sulphate Magnesia
Couldnt get a spark
10 minutes manipulation

20 Grammes in 100 cc H O,
Pyrogallic Acid = nothing after
10 minutes manipulation
Resistance very high Coil
Charge magnet with pyro in cell
strong Enough to get Ethereal
in usual manner =

20 gramme Bicarb Potash
No spark =

12

I have noticed that the gas given off on the Electrode connected to the zinc pole of the Battery in the Bi Carb Pot which is poly Hydrogen is composed of very fine bubbles & of great number whereas in the other pole the bubbles are larger & much fewer of them - but they shoot up to the top of the solution with greater Velocity & so it not possible to deduce from this the size of the H & Oxygen atoms, (i.e. relative size) so it that the specific gravity of the infinitely fine Oxygen bubbles by so much greater than the H bubbles retain them hold on the Electrode. being thus allowing a number to coalesce & run into Each other this would account for the difference in size.

= I notice today that aluminum with Carbon in Sol of Sal ammon.

there was formed an immense number of gas bubbles varying apparently superimposed in the other (appx) 1/16 inch thick they appear to cling to that metal with remarkable tenacity they may be slid up & down in the aluminum with a point under the solution without detaching them in fact it is very hard to detach them no amount of shaking will clear the plate of bubbles - this probably accounts for the remarkably polarizing properties of the metal as shown in Exp 9 Experiments -

It was Carbonic acid gas given off on the Electrode Connected to Coke - it put a light out =

14

5 gramme
Licorice -
Nothing =
forms gas on Electrode Connected to Carbon which collects in masses in the Acetic solution & Comes to the top in lumps like the Curds of a precipitate =

---

8 grammes Bi Carb Soda -
Nothing = Bubbles on both appear to be larger than with Bi Carb Potash, but that was a 20 gramme sol, that would seem to prove that the weaker a solution or the smaller the amount of decomposition the larger & slower the Bubbles were formed & detached, hence this might explain Galle's paradoxical to a certain extent)

Nitrate. Potash 20 grammes
No spark =

Notice that Electrode Commenced
to Carbon gives small bubbles which
run into exceedingly large ones
they only coming to top slowly
they hang Electrode persistently
after current open on Electrode
Commenced to 2 mi, Bubbles
smaller ~~dont~~ run into each other
in the least apparently have
no affinity = on opening the current
the bubbles gradually rise & it
take sometime before the
plate is clear, = after ckt
open 5 minutes bubbles come
out of the platinum quite copiously
if it is cleared of bubbles by shaking
they immediately commence to
pour out of it = This is not

16

The case with the Electrode connected to the Carbon which remains full of large bubbles & now shake it, it becomes clear in 2 minutes it collects some large bubbles but they do not rise & the other Electrode still continues to pour out ~~the~~ bubbles. But not so copiously =

20 grammes gum Arabic Nothing =

The bubbles formed in the solution leave the Electrode with extreme slowness hence it wouldn't be a good depolarizer for a battery if any one had the insanity to use it for that purpose

Discovery

In decomposing with the Electrolysis (platina) & the 10 cells Carbon battery a 20 grammes sal of Bromide of Potassium in 100cc/H0 ~~[illegible]~~ it occurred to me seeing the great volume of gas arising to form "Vortex rings" like the smoke rings to carry out this idea a No 20 Copper wire in form of a loop then on insulating it possable rings were made when the loop was immersed a proper

distance in the solution = too deep
breaking them up by forcing
one into the top - while
watching these rings heard
a sound Every time closed
Key = after attention was
called to it found it was
very loud and could
read morse by it 10 & 15
feet away = found that
by putting ear near cell
that could read morse
through resistance of 1000
ohms = found that it made
a difference in size of ring
straight wire dont give sound
a wire bent at right angles
gives it nearly as loud
as ring =

found that placing ring in particular part of solution got it louder = ~~but~~ keeping the key ~~continuously~~ closed the sound was a vibrating one, like a tuning fork making about 40 per second — by pushing loop down lower in liquid & in fact up & down could get different tone = tried piece iron wire in end of Copper wire in a loop = it was fine wire = gave it very good = thought plating a wire nearly ditto 1/8 inch wide sheet aluminum The new wire after being in use a month commenced to give off bubbles after current ~~[illegible]~~ opened & continued to do so for 5 or 6 minutes until took it out probably the absorbed Hydrogen

Bromide Cadmium gives off
no gas = Cadmium deposition on
Hydrogen Electrode & Bromine at
pre on. Oxygen = perhaps.
Cadmium & Zinc might be used
for a battery. Brom Cadmium
used instead of Sulphate of Cu
in Callandbattery =

Phosphate ammonia 5 gramm
Curious = with bent loop
Copper wire = it works quite
plain but giving a ultralty
sound like Brom Pot = but on
opening key there is a short
after sound like the frying
on lard in a frying pan
I reversed the battery
so that Ox would come

21

on the copper loop heard
nothing of the regular signals
but the hard frying pan noise
was there & heard only after
opening

Chlorate of Potash 8
grammes — very hardly
not sharp. only hear it when
loop is near top of water.
We notice that H leave loop
much sooner than O leaves
platina & get full quicker.
this explains why H is
best for producing a mark
on chem prepared paper for
Auto Telegraphs

get over

1 gramme
Formate of Copper =
No gas - deposits Cu on day

1 Gramme Citrate of Potash
Best yet = Very strong can
hear it myself 2 feet away
= the lower the loop is
immersed the greater the
sounder of brought near
(1 inch) top of liquid hear
nothing = its like land fry
but clear + sharp quite
beautiful Morse = but dont
know if it as delicate as
Bromide Kali = ought to
have a 10 gramme w. meas
Solution =

23

There is something Curious ~~[illegible]~~ about the Looped wire = if you use a Rubber Coated wire just heavy Slight but Capp not to seem Capp fone wire loop to you can hardly feel it = if you use a No 2/0 bare wire ~~[illegible]~~ with loop it not good. but if you have the No 2 wire Coated loosely with Cotton & bare near tip & bend to a loop, its loud again = fine wire wire works well = the loop is not necessary as it shaughlend it but it worked well though the Sound appeared to be different =

flap over

24

2 grammes
Tartarate Soda
Equal of nat the best

Tried a deep hydrometer glass
full of Salt water — immersed
Electrode deep gave could
hear it faintly but I couldn't
hence no good not because
I couldn't hear it but because
if I couldn't it wasn't worth
a damn

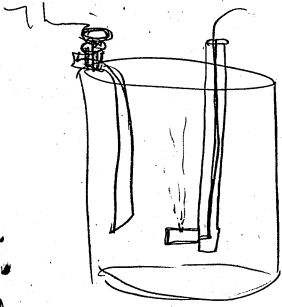
Tannic Acid 10 grams
Hear it myself with Em to
cell but not good = 1 hunte
reason is due to high
Resistance of Tannic Acid

Sulphate Zinc 20 grains
gives a higher note & very
nice & sharp. its loud too.
but alas the unit Cu soon
deposits Zinc & then the
Duet music stops =

Chromic Acid ¼ gram
Can just hear it mix quad

It is probable that if an
Electrode Cu made thoroughly
insulated except at the
End & that be provided
with a copper ~~tap~~ tube
~~with~~ closed at the End & the
outside entirely insulated

having small hole drilled in tube so that gas is formed inside and must escape by this orifice that will produce a greater noise and give any note required



Sulphuric Acid & H O

Very strong poly sharpest dont hear it on 1000 ohm

1 ounch = perhaps Electrode Bad =

Hydrochloric Acid ~~at~~ HCl,
First Class

New Discovery

If a piece of Carbon points for Electric light be held in the hand and inserted in the liquid one Electrode being platina & connected to the Carbon of the battery & the other being a piece of No 2 lose Copper wire in iron ~~loop~~ loop and the Carbon allowed to touch the platina it will when entirely disconnected from it as far away as can be give a spark by touching the iron wire of the loop under water

28

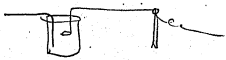
Quizwork 6 am

We Recommence work. at 2 PM

January 12 1897

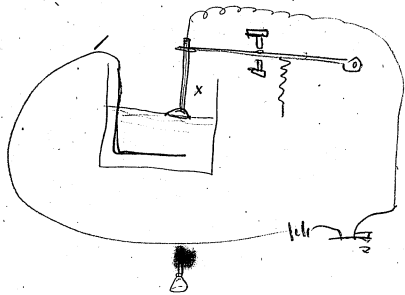
The idea has occurred to me seeing the great volume of gas given off by Electrolysis in proper solution and its suddenness that by the use of a proper cylinder & valve that more power could be obtained by Electrolysis than through the intervention of magnetism =

I have noticed that the Electrode having the looped wire on its end is arranged thus



is moved up and down by closing the current (1-2) up on closing being buoyed by the gas = The idea has occurred in this connection to make a gas relay for lighting

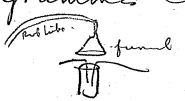
Thus



X being a hard rubber funnel with a funnel end. inside is lined near top with platinum; connected with the battery by fine wire running through X. the thing floats dipping slightly in H_2O, if ckt is closed gas pressure lifts stop to a point where gas escapes - or a reverse current might be sent when it accident escape recombination probably would take place =

30

20 grammes Caustic Potash.



Very good first class. can hear the plan with funnel $1\frac{1}{2}$ makes any from Cell = = Think this solution with small wire platina loop in Copper Electrode was to best yet except perhaps HCl =

20 grammes Hyposulphate Soda First Class Equal to any =

20 grammes Iodide of Potassium Not quite so good as above =

20 grammes Common Alum Not very good as Iodide. hear plan though = large Bubble in H = "

1 gram Camphoric acid
Has nothing at all probably
because resistance too high

Ferrocyanide K. 20 grammes
have nothing Extra = few bubbles only

Nitrate ammonia 40 grammes
have when ~~Etc~~ Copper sent
to Extra nothing Extra

20 grammes Nitrate Rhodia
first class

40 grammes, Citric acid
Not very good

20 grammes Sulphate of Soda
First Class equal (about) to
any —

20 grammes Carb Soda
First Class —
W. add 500 always now after taking it on about Ckt

1 gramme Arsenate Quinine
on Ckt Weak = 500 al[illegible] R can just perceive of

1 gram [illegible] Arsenate Quinine
Sckt Weak = don't hear on 500

5 grammes Arsenite Soda
in first closing Ckt strong
then grows rather weak
not good on 500 nothing

33

1 gram Valeriana Soda
Weak

150 Mg. Hippuric Acid —
Nothing

1 gram Valeriana Magnesia
Very faint on shtckt =
gram reads a foot away, on
500 ohm [illegible] nothing

5 gram [illegible] Bromide Sodium
first class = gram reads at
more distant than above on
500, & think I can just hear it

5 grams Arsenate Soda
pretty faint = Exceedingly faint
on 500 gram just hears it

34

1 gram Caffein —
Nothing at all

1 gram Carbonate of Lithia
~~Fair~~ good = nothing Extra,
Gin just mean it on 500.

1 gram Carbozatic Acid —
~~Good at first~~ but poor =
gave [illegible] at the regular
dose [illegible] (1c) 1 front [illegible]
500

1 gram Iodide Quinine ~~=~~
Weak —

1 gram Sul Cobalt
Nothing good =
nothing on 500 also gin

35

1 gramme Acetate Solution
Very Weak

Endorsed Note Book
No 2

June 12 1897
Edison & Adams

36

Memo Relative to

EXPERIMENTAL

NOTES

No

Relative to Nouchen and
in decomposing Cell in
Passaic Creek —
Jany 12 1877

1 gramme Tartarate Magnesia =

Very weak = 500 ohms = adams hear it ~~close to bottle~~

1 gramme Cyanide Mercury =

Very weak on short ~~clit~~ = 400 ohms adams cant hardly hear it on long close to bottle.

1 gramme Acetate aluminum =

Weak on short = nothing on 400.

5 grammes Manganate Soda —

Fair = 400 ohms Adams Scarcely hear it =

1 gramme Acetate Morphia -

Nothing =

1 gramme Hypophosphate Manganese —

Very weak = 400 adams hears nothing

1 grm- Chloride Copper —

Weak in short - nothing on 400.

5 grammes Lactate Zinc -

Not very loud but gave low vibration about 10 to second = like frying lard in pan = adams can just read at 400 ohms

5 grammes Formate Soda —

good = fan at 400 ohms —

5 Grammes Sulphate Cadmium

1st touch key first class = died away = cause - deposition of Cadmium

nothing on 400 —

40 grammes Ferricyanide Potassium
First class - loud = 400 ohms cant
hear it =

1 gramme phosphate Potash.
First class not so strong as above -
= 400 ohms adams just hears it =

5 grammes Tungstate Soda -
First class - louder than Ferrid =
400. fair —

5 grammes Chloride Nickel.
Loud ~~at~~ first dies away

2 grammes Binoxalate Potash
Good = 400 just hear it

1 gramme phosphate Soda —
good = 400 ohms mercury dont hear

5 grammes Acetate of Baryta =
Not very good = 400 ohms adams
foot away hears it quite

5 grammes Citrate ammonia —
Slightly first Class = 400 Ohms very
faint indeed =

3 grammes Oxalate Soda —
First Class — 400, Ohms. Scarcely hear it

5 grms Bi-chromate Ammonia.
Nearly first Class = 400 ohms
Adams just hears it —

5 grammes Citrate Potash =

Strictly first-class = 400 ohms Adams

Cant hear it =

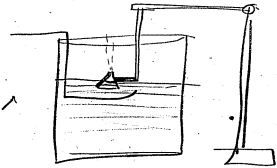
5 grms Nitrate Magnesia =

Weak = 400 ohms just hears it =

5 grammes Tartrate Potash =

Nearly 1st Class = 400 ohms Nothing

Try this



All insulated except inside of funnell & orifice which must be very small =

1 gramme Creosote =
Nothing

---

5 grammes Stannate Soda —
First Class = 400 ohms Adams hears it
Plain =

---

5 grammes Manganate Potash
First Class = 400 ohms - Hear it very plain

---

1 gramme Tungstate Ammonia:
Weak = 400 ohms, good Hear it on 2000
Ohms

---

1 gramme Valerianate Zinc.
No good = on 700 he hears it. also
just hear it through 1000 = probably
resistance of Sol so high addition
of the R dont make much difference
I think the lighter the spec gravity of the

fluid the greater the noise =

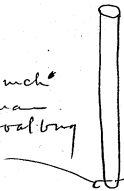
20 grammes Chloride Lithia
Weak = 400 hardly hear —

1 gramme Picrate Ammonia =
Fair = 400 ohms can hear it plain
through 1000 ohms better than lithia
Ammonia = it ~~more~~ d more
distinct =

5 grammes Hydro-Bromate Ammonia
fair to good = 400 ohms very faint

Tried about 1 inch of solution
in Cell covered with $2\frac{1}{2}$
inches Ether immersed
Electrodes in decomp solution
no difference (1.) nothing favorably

Took along tube



with platina decomposing points sealed in end = used 20 gram solution Potassic Hydrate = but it took at least 5 seconds before heard a noise then

it sounded like the frying of grease it took 5 or 6 seconds to stop after key closed = Oxygen was put in tube in bottom = then Hydrogen was put in tube with bare platina in bottom = put old covered wire + platina loop in no bottom poured it out in little cell + tested in usual way — splendid loud then shows that much depends upon size of cell amount of

fluid + disposition of the Electrodes =

By using the long tube + putting both Electrodes in the top OK = by putting the Oxygen Electrode down to bottom of tube. Bad - same phenomena as described on other page =

Jany 13th 1877

5 Gram
Phosphate Manganese
Very good on short Ckt — can just hear it —
1000 ohms closed bottle

5 Gram
Monochlor Acetic Acid
Weak cant hear anything 400 ohms

5 Gram Sulphate Vinum
Weak on short nothing on 400 ohms

1 Gram
Acetate Strychnine
Nothing on short ditto 400

1 Gram
Lacto Phosphate Bismuth
nothing on short — ditto 400 ohms

5 Grams
Phosphate Ammonia & Soda
When Electrodes is at the bottom takes long time to die away bring Earthen Electrode to the top. Clear and sharp but not very loud hear it on 400.

1 Gram
Per Chlorate Potash
good on Short weak on 4000 ohms
20 Grams
Grape Sugar
Can hardley hear it on Short Nothing 4000

5 Grams
Iodide Zinc
Nothing

1 Gram
~~Lact~~ Lactate Quinine Nothing

1 Gram
Chloride Propylamine
Weak Can only hear it

1 Gram
Sulphate Strychnine
Nothing

1 gram
Hyposulphate Barium
Only hear it close to bottle

47

1 Gram
Iodide Arsenic
Weak on short nothing on 400

1 Gram
Chloride Urinium
Weak on short nothing on 400

20 Grammes
Iodide Ammonia
Fair on short ckt nothing 400

1 Gram
Iodic Acid
Fair on short nothing on 400

1 Gram
Sulphate Cinchonidin
Nothing on short ditto 400

1 Gram
Lunar Caustic
Nothing slight decomposition from the oxigen bottle only

1 Gram
Saponin
Nothing Short ditto 400

1 Gram
Nitrate Strychnine
Nothing on Short Nothing 400

5 Gram
Chime Acid
Nothing on Short ditto 400

1 Gram
Pepsin
only head it on Short nothing 400

5 Grams
Nitrate Urinum
Very weak Nothing on 400

18 Grams
Valerianate of Potash
Very good on Short Nothing 400

20 Grams
Uric acid Nothing ditto 400

8 Grams
Oxalate Potash
Very Weak Nothing 400 ohms

8 Grams
Iodide Sodium
fair on Short just hear it - 400

1 Gram
Lactate Iron
Nothing on Short - Nothing 400

5 grams
Acetate Zinc
Cant hear anything bubbles dont break
off from the organ pole unless the key is
opened when it does very quick but if the
key is kept closed for a short time
it will go of slowly

3 Grams
Gallate Ammonia
Nothing on short ditto on 4.00

1 Gramme
Chloride Morphia
Very Weak on short ditto 4.00

20 Grammes
Ammonia Citrate 9 ozs
Mix

1 Gramme
Arsenate Ammonia
Very Weak

3 Grams
Chromate Potash
Very Weak

1 Gramme
Borate Copper
Nothing on short Northup 4.00

1 Grame
Citrate Magnesia
Only heard it

51

1 Gram
Tartarate Magnesia
Very Weak on Short nothing on L400

5 Grams
Bi Sulphate Soda
fair take some time for ~~[illegible]~~
to die away after opening

5 Grams
Chlorate Soda
Not very good Nothing on L400

1 Gramme
Sulphate Anilin
head Nothing on Short ditto L400

5 Grams
Acetate Lime
can only hear it on Short

1 Gram
Phosphate Lime
Nothing on Short ditto L400

5 Gramme
Acetate Magnesia
Very good on short can only hear it
1 foot away on 400 ohms

1 Gramme
Protochloride of Tin
Can only hear it close to Bottle

20 Grammes
Per Manganate Sodium
hear it plain one foot away
takes some time to come out after opening

5 Grammes
Acetate Cobalt
Can only hear it close to Bottle

5 Gram
Iodide Barium
Very good on short can hear it close
to Bottle on 400 ohms

20 Grammes
Protochloride of Iron
Can only hear it close to bottle on short circ.

5 Grammes

Hyposulphate Ammonia

Very Good on Short-Cut — can Hardly hear it on 400 ohms

---

1 Gram

Valerianate ~~Ammonia~~ Morphine

Nothing on Short Cut — ditto on 400

---

5 Grammes

Mannite

Nothing

---

1 Gramme

Salicylic Acid

Very Weak

---

1 Gram

Asparagin

Very good on Short-Cut —

Can hear it Close to Bottle on 400

---

1 Gram

Glycocoll

takes a long time to Clear itself from Carbon Bile

Common effects of Strychnine

Sarcolactate very good

20 Gram

Chloride Zinc

Nothing on Short ditto on 400

5 Gram

~~Antin~~ Anti Arsenate Potash

Very good on Short Cat-can hear it-cl

to Bottle on 400 ohms

1 Gram

Sulphate Bebarin

Nothing on Short ditto on 400

5 Grams

Chloride Magnesium

Can only hear it close to Bottle

1 Gram

Sulphate Calcium

Can only hear it close to Bottle

10 Gram

Phosphe Wolframic Acid

very Weak

55

5 grammes Lactic Acid.

Fair = Can't hear on 400

20 grammes Chloral Hydrate.

Nothing at all = fine bubbles on H large on O = apparently more gas from O than H =

1 gramme Phosphate Magnesia

Can't hear it. Jim says he can ~~it~~ very poor = yet there appears to be plenty gas given off O =

5 grams Iodide Cadmium

Nothing whatever = apparently Iodine on Oxygen Electrode & Cadmium on Hydrogen

56

20 grammes Nitrate Lime =
Just Class = Hear it plain
though 400 ohm with Ear to
bottle mouth =

1 gram Chloroform.
Nothing = High R probably

20 grammes Sulphate Copper
~~Nitrate~~ Extra first Class

The Sound is different from
any Solution yet tried = its
Sound, like drawing a
room pad lengthwise on a
wire to make longitudinal
Vibrations. After closing for 1/2
minute the Sound gradually
dies away & then has plain
gas noise not loud over

57

It is probably due to deposition of Copper for if I take out wire & rub off deposited Copper I get the same kind of noise again = when the deposit of Copper is on I notice that the regular noise requires time to [illegible] to stop =

5 grammes Gum Dextrin.

PHENOMENON

First Class : on short ckt the noise which is loud is made up of that sharp explosions occurring about 6 or 8 per second on 500 ohms these explosions are nearly as loud but qwe 2 to the second on 1000 ohm 1 per second

on 2000 1 every 2 seconds

4000 ohms 1 every 4 seconds.
~~The noise~~ 400 on = on 10000
the noise of the explosion is
undiminished, and we could
probably get through any
Resistance but the noise would
be further apart = The Electrodes
were on P. platina wire on H
No 2 office were Carbon Cones
with platina loop on end =
perhaps if it were moulded
all the way to the platina loop
it would give better results —
The reason further investigation
By varying the Electrode it
got the explosions so close together
that they sound nearly like
the regular noise, in short.
Circuit they are better than
anything yet to read by

are very plain in 1000
impact this is the only satisfactory
solution that I have seen yet
that I could read in 1000
I having so. heard = to very
plain on 1000 but the
explosions are about 1 per
second hence could not be
used for signalling =

5 Grammes Gum Tragacanth =
Don't give hardly any noise =
But Phenomenon on the Oxygen
Electrode there is deposited
a Graceful layer to tragacanth
which is due to the gas =

5 grammes Oxalate Ammonia
Extra first Class I heat it
8 minutes off. on 1000 ohm
got Explosions 1. seemed apart
+ like Dextrin = but not so
strong =

20 grammes Sesquichloride of
Iron =
Good at first not good
afterwards =

20 grams Pyrolignos acid
Not very good = get the Explosion
but good though 1000 ohm
over in 2 seconds

61

20 grammes Tartaric Acid.
Not good here it though on that
circuit =

---

5 grams Venice Turpentine + 1 Gram
Caustic Potash =
Not good = Phenomen =
on the Oxygen Electrode there
is deposited a Coating of
Resin or wax which can be
peeled off as cuticle what
this =

---

5 grammes Sulphuret Calcium
Good nearly 1st class
~~[illegible]~~ 2 days Can just here on
400

62

1 gram Caustic Potash
5 grams Gamboge
Not good = forms
Layer of gummy stuff in
O. Electrode & white stuff
on N.

5 grams Gum Guaiacum
No good

20 gram Sulphuret Antimony
No good = gas bubbles on
Short circ't

5 grms Nitrate Lead
No good = deposits on N

1 grm Caustic Soda 5 grms
Gumboogie =
Good at first bad afterwards

5 grams Gum Guaiacum
5 grms Caustic Potash
Good at first) nature good
afterwards

40 grms Caustic Soda
Very good probably
Was first class appears to
be an enormous decomposition
of fuchsin grms without
a proportionate amount
of noise =

5 grammes Caustic Potash
5 gram Gum Tulu —
First class on closing - then
goes to nothing

5 grms Gum Senegal
1 gram Caustic Potash
Nothing good

5 grms Gum Benzoin
1 gram Caustic Potash
fair

1 gram Gum Incense
Nothing probably on
account high resistance

1 gm Balsam Tulu
No good

40 gms Glycerin
Just fair

2 grams Gamboge
Nothing

5 gms Gum Myrrh
1 Caustic Potash
No good — Beautiful
Experiment for Lantern
on O pale the rise solid
Cones one filling in the
other, most beautiful sight
by it

1 gram Caustic Kali.
4 gm Sandarach
good = gum dissolved in O, Alcohol

5 grammi Balsam Peru
1 Caustic Kali —
Not very good

4 grms Balsam Canada
2 grams Caustic Potash
Not very good. while deposit on O sticks with great tenacity

5 gm Tragacanth
1 Caustic Potash
No good

67

1 gram Butrate Palash
Not good

1 gram Tulu
5 " Canada Palash
First Class

5 grms Balsam Peru
5 grm Canada Palash
good to first class
nothing on 400

1 gram Benzoic Acid
No good = probably on
account of high Physical

68

5 grams Balsam Copaiba
1 gram Caustic Soda
Nothing

This finishes the
Water Solution

Jan 13 1896

69

Merlo Laboratory

Experimental Notes

No 3

[illegible]
heard in the decomposition
Cell in the passage of
an the Current
Paris 1 18[illegible]
+ [illegible] Mercury
under Electrolysis

7 pm Saturday 13th 1867

We now having exhausted our water solutions take up the alcohol series

Wells Carbon bodies

~~[illegible]~~

Alcohol - Nitrate Uranium
~~Hg~~ Nothing heard - slight amount
gas from Ethereal =

Alcohol Acetate Mercury
Nothing
no other gas

Oil Rosemary & Pulegium
nothing

Alcohol & Gum le Palissy
Nothing cannot
gas in Ethereal

72

Alcohol & Alcohol Triplicate
Nothing [illegible] (1) [illegible]
[illegible] around [illegible] Church

Alcohol Dyspepsia & [illegible]
Nothing

Alcohol = Bogus Carbolic Palate
[illegible] Hand of little [illegible]

Carbolic Pa Cash Oil Rosemary

[illegible] Zinc -
Nothing

[illegible] Iron
Nothing good

73

Alcohol & Bromide Cadmium
Nothing

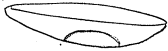
Nothing

Spirits Turpentine & Chloroform
Nothing

We conclude that the
the
highest in the Solution
We are now going into experiments
with 1 & 2 & 3 & 4 with different
Shapes of Electrodes Jars &c
&c

74

Experiments with globule of mercury placed in flat dish covered with different solution = 2 Cells, Carbon Battery platina Electrodes think



Mercury not very pure

I believe that friction of surface keeps the mercury globular & that if globule forms ~~[illegible]~~ the Zinc pole hydrogen is set free and this acts to [illegible] like the EMq the [illegible] it spreads out = [illegible] if it from the [illegible] oxidized ~~[illegible]~~ to be mercury so to spread

an alloy of an oxide & mercury
hence lessening of the globule &
flattening out = after its been
flattened it may be brought to
globule state by causing it
to be the Zinc pole = the H
reducing The oxide = 9 nature
that when it is the Zinc pole
the globule moves freely
on bottom of dish but if
the O pole it shrinks somewhat
doesnt have free movement

20 grammes Tantalic Soda - 100 c.c.
Platina Electrode
Mercury draws out when connected to
Zinc pole =
~~with~~ all Metals act as
in drawing it out
~~Fe~~ Aluminum
Zinc Copper -
platinum -

How speedily not a sign of affinity
with Mercury to Oxygen =

20 grammes Sulphate Zinc =

Hg = remains beautiful rounded
when both poles are only dipped
in solution and touching Hg
the film moves = with either pole
in Hg. it is not attracted (18)
does not tend to reach out towards
the pole - like the Tartrate =
film moves which Cop or Zinc
in in Hg = that with Platina
Electrode = with platina to Hg
Slight affinity to
aluminum Move so towards

Tin - do Copper = Lead do Brass
not so much in Zinc
Very little movement
Carbon to Hg

10 grains Tannic Acid
when Hg Commenced to Zinc of
Gally all metals attracted,
nothing seen when Hg
to Carbon = Nothing Naturally
[illegible] aluminum

---

20 grammes Commercial alumi
Hg to Zinc, [illegible] duces drawing
out & attraction with all the
metals except platina & aluminum,
none on platina - yes after what I notice
large gas bubbles under Hg
which raise it up and in its
Effort to Escape keeps the
Hg in Violent Motion =

o Electrod

1/4 inch attraction

nothing seen when Carbon to Hg =

1 gramme Bichromic Acid spreads at first class, when Hg to Carbon it sticks well to dish but to Zinc its moving about by moving Electrode showing liquefying in friction = it flattens when connected to Oxygen & globulate when connected to Hydrogen =

1 gramme Citrate Palad, Excessively Mobile = either towards all metals no oxide formed

20 grammes Caustic Potash

Phenomena

With Oxygen on Hg. it rapidly oxidized and spreds out flat over a surface several times the size of the globule & is coated with a beautiful film which in time became black ~~if left~~ if now Hydrogen Gas is passed to Hg the Oxide is reduced ~~& the~~ it assumes globular shape almost immediately & became clean — Beautiful Experiment this

dont spread when Hg is connected to Oxy[illegible] with an aluminum El[illegible] spreads quick with Hy[illegible]

very little with Carbon lead &
Zinc nothing good Copper
good = (Notice that there is not violent agitation
where oxygen & the Hg which the oxide is being
reduced by H but rather it is than for an
instant there is a vacuum current =)

Lograsmus Jade de Palomon

Phenomenal Galvanism

1st Connect Hg with H then
with O. beautiful mirror
in top of globule which
stays for 10 or 15 seconds =
= There is a fearful agitation
of the mercury when one
pole then the other is
connected to it then but
connected together =

I notice that the Current
or gulf stream circulation
proceeds from the O pole
towards the Hg with pole

I prove it by connecting Zal with strips of paper which is on table & touch H. pole to this = ~~to~~ Has an actually after Electrode disconnected via phenomenal

---

20 grammes Hyposulphate Soda. Not very phenomenal spreads very slightly when ~~Hg~~ O to Hg.

---

20 grammes Ferrocyanide Potassium Very Mobile dont spread out flat but very little. When Hg connected to O, opalescent oxide collects, which is instantly reduced by H.

Gum Dextrin Salycilic Acid
+ Lith. Salt nothing
phenomenal

40 grammes Citric Acid
nothing phenomenal -
doesnt spread out in the
least on Eulk

~~Also 4, 18 grm~~ same Hg as above alloyed with

40 grammes Nitrate Ammonia
Not very good =
amalgamated Hg in platinum electrode
connected to
makes a precipitate which clouds
sol so can see =

84

20 grammes Carb Soda
Very Mobile attracted
touched with O Electrode
instantly squats & sticks
to dish touched with H
Electrode instantly assume
globular form & is mobile -

Fresh Aq
20 grams Sulphate Soda
Exceedingly Mobile

Phenomenum when Aq Connected
to O pole it assumes a
more globular form (ie) contracts
& gets higher coherence if it
is connected to H it spends
out but very little not more
than its normal globularity -
when it assumes a more globular
form it sticks to dish - it retains
the form of even Current open & it

is pressed down with fingers
but moment H pole is removed
it instantly assumes its
normal condition:
Great agitation of H pole
is in liquid & O. pole
held in liquid just over
Mercury

---

20 grams Bi carb Potash
Very Mobile Phenomenal
O, ~~H~~ connected to Hg - it
spreads out flat slowly & in
curious shapes; but instantly
assumes normal condition by
opening circuit = I notice
that if O being connected to
Hg for some time that H
can be put in it

then connecting Gath
pole to Hg when there will
be an energetic circulation
of gas or something over
surface of Hg. between two
poles which causes in few
seconds apparently Hg.
absorbed something =

---

40 grammes Sulphate Magnesia
Excessively mobile
reaches out for ⊖ Electricity
1/2 inch = Very Violent
Current =

---

40 grammes Nitrate Strontia

Not good = hardly moves; apparently absorbs something which Hg combines with.

---

8 grammes Borate Soda

Nothing very noticeable when Hg connected to O. it instantly sticks to Cup =

---

10 grammes Bichromate Potash =

Not good = apparently Hg. itself has no mobility in this solution = Scarcely attracted by O pole & when it is it must be close & then nearly whole globule spreads instead of a short out towards O pole = this may have some effect to do with polarization in a battery

88

40 grammes Bromide Potassium
when Connected to O,
Contracts instantly, assume
normal Condition when
touched with H.
or when O taken from it and
touch in Solution just about it

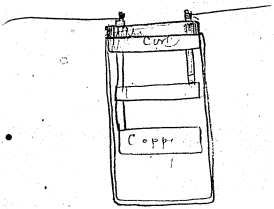
---

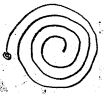
20 grammes Pyrogallic Acid
Poor

---

20 grammes gum Arabec
no good
Good Idea to get a lot
of Hydrogen gas
Use a syrupy liquid with
Electrodes the Hydrogen
gas bubbles. Cant get up
freely never Enormous amount of
pretty Stuff which will be 1/2 or more
pure hydrogen

Interesting Note



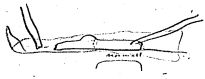


89

8 grammes Bicarb Soda –
Mabel = spread out
slowly with Hg to O,
& not very far instantly
restored by Hg to A.

---

20 grammes phosphate Ammonia
Mabel = When Hg Crunched
to A pale fearful undertow Current
from O draws out Hg &
a gas bubble (9 knuckle) raises up
Hg about twice a second then



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20 grammes Nitrate Potash
When O to Hg. oxidized quickly 1st
black oxide then a brown volatile
floating oxide which gets re-
duced & forms a shell which
breaks off from Hg when electrode
with tar & stays in solution
by oxidizing surface slightly
& then deoxidizing with Hg
beautiful think crystal or
flakes of the substance can be
made quickly they are indiscreet

---

20 grammes Bromide Ammonium
with O to Hg beautiful
indiscreet oxidation =
peels off = when first
connect Hg to O. it trembles
and takes several seconds
before oxidation commences

8 grammes Chlorate Potash
& Acetic Acid Mobile
Not very phenomenal =

5 grams Chloride Nickel
very little movement = a little
fugitive oxidation

40 grammes Ferrocyanide Potash
Not good Dont move =
= apparently Hg to Hg
gets an oxide (10) & mean a
Coating =

10 grammes formate Copper
Nothing whatever

20 grammes phosphate Potash
Very Mobile - spreads out
very slightly when Hg to
O =

---

5 grammes Tungstate Soda

Cadmium Sulphate 20 grammes
= No good - no movement
Hg with O to H point
after which Cadmium deposited
in H.

---

2 grames Binoxalate Potash
No good

Loadale Zwie

Formate Soda.

Phenomenon

When Hg ~~was~~ has been connected to Hydrogen for 1/2 minute or so & then its connected to O, a most violent agitation takes place in Hg which towards the last boils & splashes about in a most zealous manner & then suddenly be quiet & stays so until it is again allowed to be hydrogenized & find that after it has stopped that the most infinite hydrogenizing only a fraction of a second it same violent boiling takes place & keeps it up just as long as if I have Hg connected to H for 1/2 minute

Curious

5 grams Trichromate ammonia -
Phenomena =
Connecting Hg to O. Short
from the mercury can be
made to follow the H pole
all around the cup

5 grammes Acetate Baryta -
Very Mobile --

5 grams Tartrate Potash
Exceedingly Mobile
water between when H + O
Electrodes are placed in
beyond Each side of Hg
it draws out lengthens
1/4 to 1/2 inch

5 grams Nitrate Magnesia
Nonqvod

5 grams Citrate Potash.

Very mobile & after being
thoroughly oxidized the more
lowish of the H Elements
apparently deoxidizes it &
they if H be kept in solution
most violent boiling & Calorific
takes place until it comes to
Octal of rest

5 grm Citrate ammonia.
Very Mobile qvod =
dont know the above phenom
Gas Cit Pot = funny work it

Wednesday 16 1877 =
I am J M Edwards
79 Wm Adams

96

Jany 17, 1897

We now resume our experiment on the movement of globules of mercury under Electrolysis in Solutions of Various Substances 8 PM =

100 Mg. Citrate Quinine =

Note When I gave Zinc Electrode & mean Carbon & un changed connections unknown to me

~~Previously I had a round platina~~ wire 1/16 diam to form the Electrode Connected to the Zinc pole but having to use this I substituted a flat sheet same as that connected to Carbon pole which is about 3/16 wide & I find that with the above Solution (& will probably find with others same I have a fine point) that if point of Zinc Electrode be brought in Contact with Hg + then just withdrawn it will vibrate automatically like the beat of an indication Coil

& the Carbon Electrode Unit from Dry Battery

the Hg being attracted (B) spread out
until it connects with the 2nd
Electrode when it contracts etc =
Jim hears / the noise of the
spark = this would poby be
nice with large battery =
No other phenomena

1 gramme Valuianate Soda
I find that after platina
point of plate has became
amalgamated I no longer
get self make & break this
accounts for reason why I
did not get it last night
both Electrodes where amalgamated
whereas tonight a fresh Electrode
was put in connection =
I think Carbon would replace the
platina = I find that Carbon of
a lead pencil does but the
vibration + spark is small poby
due to high resistance of lead

the Hg is ~~n~~ Very mobile -
moves from H to O freely 3/8 in d.

5 grammes Valerianate Ammonia (By oxalate)
Hg dont spread on ~~Ether~~ but
is at times as quite mobile =
forms Mercurio = H dont apparently
deoxidize + clean globule of Cinn

1 Gram Arsenate of Quinine
Mobile | Mobile =

20 grams Phosphate Soda -
1st I notice after H is connected to
Hg that its hard to get O Electrode
to connect to Hg ~~appear~~ but
after time it connects -
2nd if Hg is thoroughly oxidized
& is touched only for instant
with H. which O Electrode is still
connected it assume mobility &
if H Electrode be put in [illegible]
a fearful agitation of Hg [illegible]

which continues for 10 or 15 seconds.
a mirror forms which gradually
grows smaller & dies out when
surface is thoroughly oxidized.

20 grams Bi Sulphate P. alcohol
1st nothing very noticeable = Hg to H
forcing covered with bubbles, Hydrogen.

150 gm. Hippuric Acid =
Nothing noticeable =

1 gramme Caffeine -
nothing much

1 gramme Acetate Silver -
surface of Hg becomes instantly
black = no movement whatever of Hg

20 grammes Bromide Sodium
when both Electrodes are in
liquid & Hg between very mobile but
when connected to H it doesn't spread
but very little = when connected
to O, it oxidates with beautiful
Mirror which very gradually grows
smaller & in the mirror may be seen
particles of oxide passing in all directions
with the rapidity of lightning

---

5 grammes Arsenite Soda
Very Phenomenal Mercury in
this Solution loses all mobility
without any Electrolysis whatever

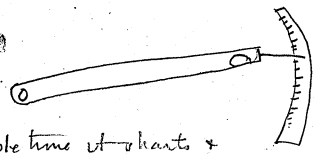
Laboratory Notes

when H is in Hg & O Electrode
held over mercury most beautiful
oxydation takes place iridescent
Colors red violet green = it cannot
be deoxidized by H = if the solution
is poured off & other solution poured
in Hg mercury assumes its mobility

This is the Only Chemical
so far that makes Hg loose its mobility
without any Electrolysis =

1 gramme Valerianate of Magnesia
rather mobile · no phenomena.

1 gramme Sulphate Cobalt (short stem)
& notice that (before allowing Electrode)
Hg is very mobile & globular in this!
= note perhaps Each Solution causes
Hg to be more or less mobile this
Could be tested thus



note time it shorts &
time it takes to reach Bottom when
Contact not well just run =

1 gram Carbonate Lithia.

Exceedingly mobile & attracted by O when Hg connected to H Electrode - loses power somewhat when ~~as~~ oxidized ~~of~~ & found that when it is allowing to oxidize a white fluccolent oxide forms on dipt & rises to top = it merely made mobile by touch of H wire when effected put in solution violent agitation continued until Hg is drawn up to a globule & is stuck to dish = no mention is made of oxidizing =

---

1 gram Carbazotic Acid =
When H is connected to Hg I found that Hg recedes from O pole = it becomes by Hydrogen semi solid without mobility.
I found by using fresh solution that Hg loses its mobility greatly without Electrolysis =

20 grammes Manganate Soda =
oxidate with very tough skin
which is gradually deoxides by
H to Hg = nothing very noticeable

1 gramme Cyanide Mercury
Nothing

1 gram Tartrate Manganese
Nothing.

1 gram Iodide Quinine =
without Electrolysis - it is not just clear mobile
though definitely moveable = with Electrolysis
not very mobile -

5 grammes Arsenate Soda -
without Electrode = Exceedingly Mobile
This is just opposite Arsenite Soda
With Electrode Hg to O. oxidat to more
globular form. Slix = H deoxidat to more mobile

200 M.g. Sulphate Quinin =
not mobile to any great extent = with Electrodes
nothing noticeable =

---

1 gramme Acetate Alumina
Mobile = with Electrodes Nothing much

---

5 grms Amygdaline =
not very mobile poly on account with Electrodes
high resistance

---

1 grm Nitro-prusside Sodium (Usually decomp Blue)
only noticeable thing is that can't
get O Electrode to amalgamate or
connect Metallically with the Hg =

---

14 grms Acetate Uranium —
Nothing = Something is wrong
with my O Electrode dont
amalgamate so as to connect to Hg
although it may be the st, + the
above solution =

105

1 gram Citrate Caffeine =
no X

1 gramme Chloride Copper
blackened = no movement

1 gramme Aloin
no X

1 gramme Tannate Iron
no X

1 gram Valerianate Quinine
no X

1 gm Acetate Morphia
no X

1 gramme Cyanide Silver
no X

106

5 grammes Hypophosphite Manganese

Mix Dry Mobile without Electricity.

20 grms Sulphate Indigo.

Mix

Go for a bath book

107

107

Experiments to determine the relative capillary force shown by the following oils.

Jan 14th 1877 Scale used attached. Small tube bottomed & scale touching bottom

Time 1.47 PM

Oil of	minutes 15	30	60	120	240	1130 am	1 PM	2 PM 7.30	10	Remarks
Lemon grass	½	4	9	14	20¼	26	34½	36	36	36	done
Juniper berry	2½	6½	6	7	7	7	7½	8	8	8	done
Spruce	0	3	6½	10	13	16½	23½	24	24	26½	
Citronella	-2	0	2½	5½	10		21½	25	30	32	
Cade	-4	-3	-2	0	3	5	9½	11	14½	13½	done
Cubebs	-3	-2	0	2	5	8	12½	14	16	17	
Carui	3	5¼	10	12	15	19	24	25½	26	26	done
Orange	6½	11¼	14¾	15	14	15	14½	15	15	10	done
Cloves	-2½	-1½	2½	6	12	19	32	15½	43	45½	
Peppermint	-2	0	4¾	5	8	9	10½	11	11	11½	done
Lemon	5	9½	13½	14½	15	16	14½	15	15	9½	done
Juniper wood	2	5	7½	9	10½	12	13½	14	14	14	done
Tansy	2	5½	8	9	9½		10	10	10	10	done
Fennel	5	9	16	20½	24		42	43	43	43	done
Sassafras	2	6	13½	20½	30	37	55½	57	60	60	done
Spearmint	3	7	14	19	25½	31	43	43	44	44	done
Wormseed	2	5½	10	14	19	23	30	30	31	31	done
Lavender flow	0	2	6	9½	14	16½	21	22	22	22	done
Succina	3	6	10½	15	22	28	40	44	50	52	
Pennyroyal	0	3	7½	11½	14	15	15½	16	16	16	done
White thyme	3½	5½	8½	10	13	16	21½	23	24½	26½	
Croton	-5	-5	-3½	-2½	0		7	9	13	15½	
Wintergreen	1	5	11	17	24	28	36	36	39	39	done
Bergamot	2½	5½	10	13½	16½	18	18	18	18	26	
Jasmine	0	½	1½	1	2	4	4	5	7	8	
Sperm	-3	-2½	0	2½	7	11½	22	27	35	39	
Cajeput	0	2½	6	8	11	14	20	21½	24	25	
Origanum	3	4½	6	8	9	10½	12½	13½	14	14½	
Thyme											

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January 14 1877 — 15th

Times	PM 15 minutes	30	1 hour 60 shown		4 hours		1130 or PM 730	Remarks
Kerosene 1.58 PM	3½	6¼	11	17¼	25½	34	55	64 – the top
Alcohol PM 2.04	½	1	1	1	1	1	1	Alcohol No 2 Sealed in
						25		test tube
Alcohol No 3 4.07								to top
do 6 PM								16

Remarks.

On Friday 3rd 1876 They stood.

Sperm oil	full up	most of it	scarcely any of any from bottle gone,
Kerosene	full gone	= 1/5 gone	
Oil organum	15	3/5 gone	
Lemon grass	36	1/8 gone	
Cedar	14	Contents	
Juniper berries	8	1/2 gone	
Cubeb spirits	18	1/2 gone	gone
Carm.	26	3/4 gone	
Clove	55	1/8 gone	
Almatic	48½	1/10 gone	
Orange	15	1/2 gone	
Lemon	15	1/3 gone	
Peppermint	11	none gone	
Thyme	10	3/4 gone	
Pimento	62	1/2 gone top broken	colour yellow
Fennel	42	all gone	
Clove	31	1/3 gone	in bottle
Spearmint	44	1/2 gone	
Lavender	22	scarcely any gone	
Thyme	27	3/4 gone	
oil Cocoa	60	3/4 or more gone	
Pimento	16	1/4 gone	bottle perfectly dry top broken 38 Stocken
wintergreen	38	1/2 contents	
Cubeb	38	1/2 gone	
fennel	14	bottle dry	
Bergamot	18	1/8 gone	
Cajeput	28	3/5 gone	

109

Phenomenon.

If a piece of paper be dipped in a dilute solution of Sulphuric Acid in a bottle, and the strip say half of it be left hanging out, it will in time by Capillary attraction become wet and if detached will in time be found to be perfectly dissolved squeezing it in the hands turns it into a stiff jelly like lump = whereas the paper in the acid solution is not attacked = this is probably due to concentration of the acid by the evaporation of the water - and it opens a way to make Nitro-Cellulose for Celluloid by mixing the 3 NO_5 & 9 SO_3 & immersing ~~[illegible]~~ portions of hundreds of sheets in liquid which will run up on the sheets by Capillary attraction and thus will be a slow action thus preserving the paper and keeping the acids concentrated by evaporation of the water = February 3 1877.

T A Edison

Zinc Chloride in Solution acts same way: the water evaporating & concentrating Chl Zinc the effect is nil on the paper immersed in bottle = The paper outside of bottle is semi transparent & has swelled 3 or 4 times its thickness & contracted in width - no salient action as I can see

Stannous Chl same phenomenon, but paper coloured brownish & semi transparent & not extreme and accompanied a drop (opened out) of thick oily stuff =

110

Hydrochloric acid dilute acts precisely same as SO_3 =

Nitric acid [illegible] don't appear to Capillarize =

Sulphurous acid same as SO_3 =

Rectified Oil ambr: flop on outside bottle by Evaporation deposits thick gummy stuff. very Clear & transparent yellow color & like Canada balsam

Another Solvent for Paper

[illegible] strip of paper left in Oil of Thyme white for 10 days, semi dissolves. you can [illegible]ndly pull it out of bottle & if [illegible]ced between fingers is fully [illegible] oil as hard or butter =

[illegible]ther Experiment. put some tissue in [illegible] by 3rd. 1877 =

Another Solvent for Paper

(gets thick) juniper wood, or [illegible] (gets thick) "as stiff as wax" "but [illegible] very thick in oil"

Juniper [illegible] = semi you can strip into a dough think it [illegible] as Thymol = put [illegible]

111

mary 111/8

try it closer
nothing yes good
c
where is all
where is all
it-come good
put-ion cld ata

Another & the best solvent for paper

Oil Lemon - Clear dissolve - In small bottle
& put loose in - Feby 3/77. I notice other no effect

I notice that acid oil thyme dont dissolve paper =

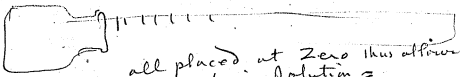
Very strange to say neither Oil of Lemon or Juniper berries dissolve the paper in the large bottle - but Oil Whole Thyme does even better than in smaller bottle = The Lemon bottle is blue glass, & has neither had as much heat or light as the smaller bottle = I think there has been a mistake

in labelling smaller bottles
Juniper wood in larger
bottle semi dessolves while
Juniper berries does not have
I conclude the Juniper wood

Arsenic acid having a thick vessel
hyped on top crystals Dolfin
& smell paper = (good for writing for
autographic poly) but the dissolve
is not A.1. —

113

Capillary Experiment with Alcohol & water in different proportions, small bottle & auto paper scale.



all placed at Zero thus allowing 3/8 inch in solution =

No 1	8 1/2	most alcohol
No 2	10 1/2	less "
No 3	11	less
No 4	9	less
No 5	9 1/2	less

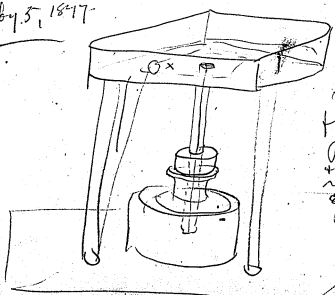
Unreliable. After 2 hours

With Capillary tube composed of a piece of Geo Little's glass capillary U Tube = Alcohol runs up a certain distance while H O a much greater distance & the distance is in proportion in which Al & H O are mixed & should think this would be a good thing for measuring percentages of Al & other liquids in H O

I find that with sesquichl Fe_2
Sul Zinc — ~~pa~~ manganate K;
in Capillary tube the Column
is not affected by magnetism
at all, possibly some liquids
might but doubtful.

I have an idea for Crystallization
that might be of some value
for some purposes this
Capillary bore of a tube rises liquid

Feby. 5, 1897.



from bottle on into
flat dish onto a
piece Bibulous paper
there being
rapid evaporation
Efflorescent Crystals
take place in
dish is full
I see this take
place in several
solutions with
paper strips.

We now attempt to make oil of white Thyme a more active & rapid solvent of Cellulose =

white paper & Mammilla Tissue =

Heat

Oil white Thyme - acetate Manganeous, 1 mix

my No	1.	Sesqui Chloride Fe.	O.W.T.	mix
"	2	Chloral Hydrate	"	mix.
"	3	Ether	"	mix
			"	mix
gmi.	No. 1.	Collodion	"	mix
Edwin	4	Creosote	"	mix -
"	5	Aqua ammonia	"	just touches it. =
"	6	Sulphate Iron crystal &	"	mix
"	7	Bromide K crystal &	"	mix
adam	No. 2.	Caustic Pot	"	mix
	3	acetic acid	"	Sulfuric.
Edwin	4	Benzol	"	mix
adam	4	Camphor	"	mix.
Edwin	9	Oil Mirbane	"	mix
"	10	Oil Mirbane & ammi oil &	"	mix =
Edwin	11	Oil Turpentine &	"	mix =
Edwin		Arsenious acid ~~Liquid~~ &	O.W.T.	mix
adam		Arsenic Acid. Liquid &	O.W.T.	dissolves it like a flash

but thinks to the Acid, as I noticed it dissolved strip this morning see 1st part of the book -

= Glycerine & O W Thyme mix.

12. Chl Calcium ~~&~~ & O W T mix

& aniline Oil & O W T mix

" acid & O W T mix

Edwin 13. Phosphate Lime. nitrate ammonia & O.W.T. mix

Gum - Sulphate Soda + OWT. mix

Edum Gelatin. + OWT. Swellings - consecution N.G.

" 14, Anilin oil. Sulphur O.W.T. Chloral Hydrate. Mix.

Adams, Natrali Cobaltcl + O.W.T. it appears to soften paper considerably but dont dissolve after heat is taken away becomes very hard = it is probable that if paper left for several days in OWT with little Natrali Cobaltcl Actual it will make a more perfect dissolve than with OWT Thymol alone = .

Edum 15 = OWT Thymol Benzoic Acid + Salicylic A. mix OWT. + Acetate of Mercury N.G.

Edum ~~16~~ gallic acid = mix

" 17. gallic acid Anilin Oil N.G.

" 18, Tannic acid aniline oil. Gum Arabic mix OWT + Solid Thymol. ~~mix~~

120

144/000
1,44,000

1200
1200
12400200
1200
1,240,200

117

Paper dissolved in arsenic acid, slimy - does not dry as the Arsenic Acid has such a powerful affinity for Water =

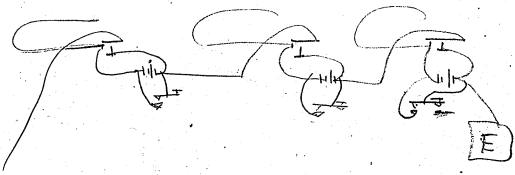
The Manganate of Soda & Permanganate of Potash 1 5 10 & 20 gram Solution in 100 cc H_2O all cause the paper slips immersed in them to become colored black & perfectly disintegrated so that the paper is hard & brittle & when dry crumbles to a black powder its insoluble in Amylic oil = alcohol & Camphor - H_2O, = Later all the Manganates & pam does it -

---

118

1/47
Feby. 6. put a long strip of
paper in Large Cochili Oil Thyme

119


E

Boston Boston. 30

This sample was taken by writing directly on the paper writing it & using it as a blotter

Feby 13 1919. M Eckm

Boston

Boston

Boston

c/
Edison what do you think if I make the rubber only half as thick

too far off

Talk lower

~~Not bad Have you got v.s.~~

~~9 ht Get now~~

time

Better g.a.

~~Not yet yes~~

Best yet

1 vc Feamer ~~[illegible]~~ hater

gor

the band
if frown to fthe rubber
and gum roberriakhram
wlldout the laseryou sent
came loud and utny seruac

I do it again

make band
to hog so it will
be fterable 9.a 9.a

~~9a~~

good lalk slow
~~reb~~ got Nothing
no the
No thing

noc no got nothing
not

124

Of it pleals Kown

No 4

20 grammes Manganate Potash
Oxidation forms strong stum &
Mercury loses all mobility & is
scarcely realised by Hydrogenizing.

20 grammes Hydro Bromate ammonia
Mercury which adheres to H electrode is
(the drop of)
by Hydrogen made to swell up
Enormously lose its mobility
like that spoken of in Chemical
works with Chloride ammonium
form an Hydrogen amalgam or
an Ammonium amalgam – it is
fearful Mobile with Electrode being attached ½ inch
by O.

5 Grams Granular Soda –
fearful Mobile when Electrode are
both in liquid Cat Hg it spreads
out ½ – about 3/16 when
on liquid + H in Hg –
it loses its power gradually (after
(been manipulated with) of spreading out but 2 Electrodes

1 gramme Ricati Ammonia
Loses all mobility without Electricity
probably from thick stiff
envelope of Oxide = (passivised)
by O to Hg =

---

20 grams Chloride Lithia -
when to O. oxidised with a Mirror
easily deoxidised by a touch of H.

---

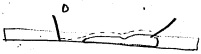
1 gm. Sulphate Cerium

Moderately mobile 1/16 advance towards
O. when H to Hg.

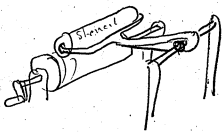
---

20 grams Iodide Calcium
Splendid when H to Hg
advance full 1/2 inch over to
O Electricity but does not
return with facility appears all
stay to bottom dish = it oxidat
but is spread by touch with H the work

20 grammes Acetate Strontia
Very Mobile between O & H +
with H in Hg - & towards O
dont apparently oxidate much
fearful Current from O towards
Hg with H in it ~~[illegible]~~ altho
form Hg Ions



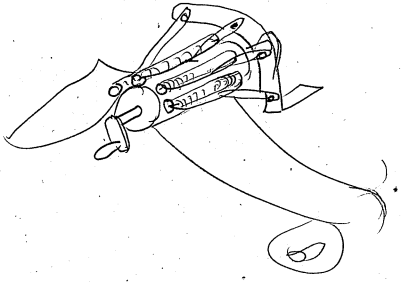
Dropped this at 12 midnight
to go in Rotary auto press thus

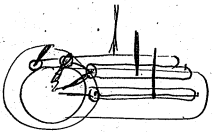


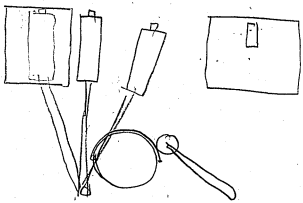
Stencil on felt roller ~~which~~
is soaked with ink (black)

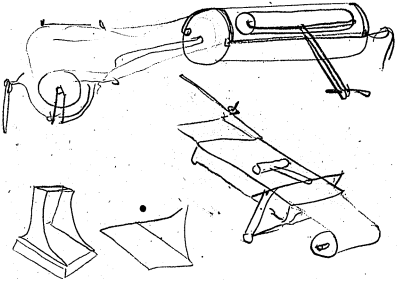
find that even with great
pressure that Copy very faint
+ uneven but if large roller (turned)
back & forward 4 or 5 times
so stencil goes over same
place that no of times gives
very good Copy: tried
Aniline Glycerine ink that
bleed through paper by weakening it &
but not making very good Copy
we now try heavier paper
but think it will be no
good what is wanted is
Second roller going over
large roller in which is cloth
ink stencil over it
~~the~~ & such roller pass
over same part stencil
make good impression

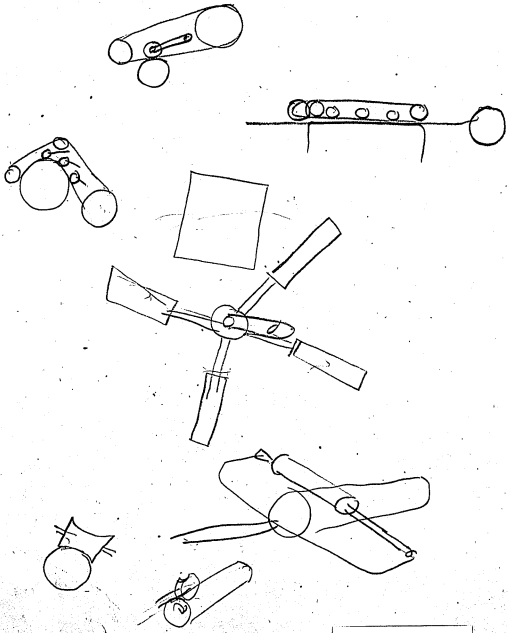
Ktm

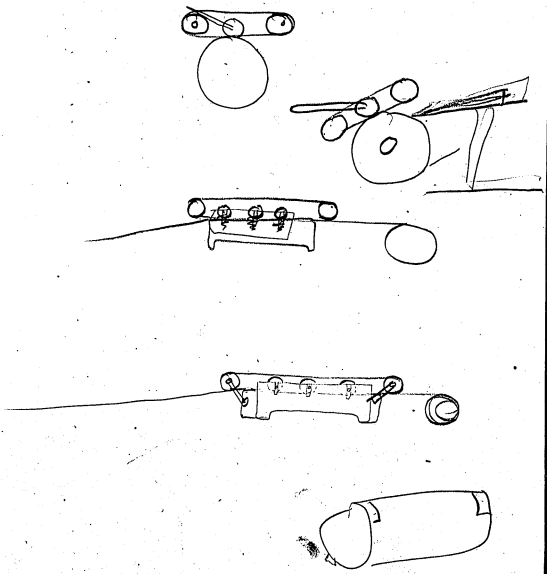












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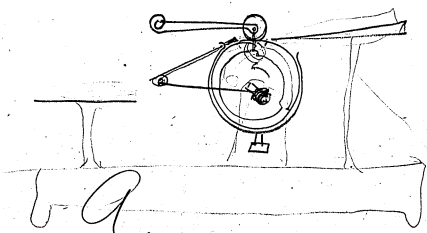
Jany 18 1877



Arts Rolling Press

Edison

135

Jany 21 1877

Again we resume the Experiments with the globules of Mercury in various Solution submitted to Electrolysis =

Kerosene oil =
~~with~~ no effect with Electrod. -
Hg dosant cohere together well altho its globules if it is cut through in various directions it is seperated in parts - if beaten it goes all in fine globules which ~~it is somewhat diff~~ dont ~~go~~ go together promptly

a few drops of SO_3 goes to bottom & turns brown reddish very little movement from the H. Electrod to the O ditto - pure Sulphur no phenom = pure Caustic Potash no phenom -

In pure SO_3 Nothing much

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Aqua Ammonia. Little movement
toward O Ethereal = No
spreading out by oxidation but
there is in Caustic Potash =

Acetic Acid nothing
do - per Caustic Potash.
makes it draw slightly
toward O. =

Oil Peppermint. No
SO_3 not better
Caustick mix

Urbane mix do Caustic Pot mix
do SO_3 mix

Water & little Salt for Cardiac
Camphor chips show no phenomena

Been sick last 3 days. Eyes very
bad Could not do much =

January 23 1874 Commenced on bad
of Standard solutions =

200 Mg. Tannate Quinine
1/64 of an inch movement towards O from
Hg to H. - High resistance makes it bad poly

20 grms Sulpho Carbolate Soda =
Mobile & bright without electricity ═══ attracted toward O 1/16 inch

Mobile with H to Hg; becomes more globular
& sticks to disk with O to Hg =

138

~~[illegible]~~

8 grms Protoacetate Copper -

without Electrode mobile but little blackened } - Absolutely no change of any kind with Electricity

---

500 MG. Carmine No 40.

No Electrode nothing mobile = } attracted considerably towards O. when platinum of O not amalgamated it acts as a sort of make & break jumping back & forward 1/32 of inch, acts strongly then way = perhaps Carbon Electrode work better =

---

5 grammes Acetate Strychnia

Mobile without Electrode } with Hg to O apparently no oxidation it retains Mobility = Attracted towards O. 1/4 inch acts strongly =. lengthens out between Electrode 1/16

---

1 Gramme Lupulin

No Electrode globules but dont move around with freely but after Hydrogen it does = } attracted 1/32 towards O. High R of fluid prevents gravity = its self make & break on unamalgamated O. Electrode -

---

139

20 grammes Iodide Iron

without Electrode
Mobile

Attracted about 1/16 towards O -
with Hg to O dont lose mobility
Know pbly dont oxidate

---

1 gramme Sulphate Cerium

without Electrode
Very Mobile & bright

Attracted pbly 3/16 much towards O.
Dont oxidate or lose Mobility
with Hg to O.

---

5 grammes Caustic Baryta

without Electrode
Moderately mobile.

Spreads out when Hg to O. like
Caustic potash but not so sharp
probably because resistance is
not so low. it does not blacken
like the KO - it is attracted towards

O on 1/32 inch yet between the Electrode
& its 1/8th of an inch = when it has been
fractured by oxidation its quickly
restored by hydrogenizing =

---

20 grms Chloride Alumina

without Electrode
Mobile
but comes up with oxide

attracted towards O.
when Electrode fixed favorably
about 1/8 inch = dont oxidate
or lose mobility with O to Hg -
Not much attraction with
Electrode between -

5 grms Caustic Soda –

without Electrode
Very Mobile & bright

{ when Oxidated Spreads out
Very thin Other Even than
Caustic Potash =

and is very quickly deoxidized
by Hg to H. the attraction
towards O. is small with
Electrode between its small
after oxidation if left to itself
it slowly regains natural position
9 inches after its been flattened
from 3/16 high globule to a
flat sheet 1/32 thin that the

Oxide is very tenacious & brown color
if connected to H the first moment
the oxide becomes black but then disappears
like a flash of lightning.

---

20 grams Sulphocyanide of Potassium

without Electrode
Mobile & bright

{ becomes very globular when Hg to O.
resumes normal condition when to
H. movement towards O. small
greater between Electrode
when connected to H. for moment
& then Electrode placed on Zinc
Sulph. Fenful Current set up Hg
spreads & there is a ripple on top it on a board
and goes at it again when connected to H.

141

1 grm Iodine =

without Electrode
Mobile Bright

with Hg to H. O attends at 1/4
inch scant = slightly brown
Electrode = dont oxidate -
first class selfmk & brank

---

1 gram Sulphuret Barium

without Electrode
Bright mod Mobile

attached Hg-O. about 1/16
dont oxidate = brown
Electrode small attraction,

---

20 grams Sulphat Vinate Sodium

Mobile

attached towards O slightly
when to H & then placed bet
Electrode spreads out greatly
enormous Current set up ridge
on top Mercury then gradually
dies away to be resumed
again after touching Hg to -H.
if Hg to O. it is greatly agitated by
Current & has bright top which
continues for sometime then it
suddenly assumes a more globular
form as steel of knocked for
instance Hg-H. the Hg is again thrown
in violent agitation =

6 grammes Acetate Nickel.

globules but best more with freedom. { Exceedingly small movement towards O. on fractional part of the globule bulges out about 1/100 = no other movement =

40 grammes Cyanide Palladium

Without Electrode Very Mobile. Becomes covered with gas. they leave from it { Attached nearly an inch by O. Very great also between Electrode - its attached 1/16 by H

if connected to O & touched by H. top shews far 10 or 15 seconds beautiful Mirror surface =

30 grammes Hypophosphite ammonia

without electrode not very mobile { Hg to H attached by O. 1/4 inch between Electrodes 3/16 = gas is formed when Hg to H

10 grammes Bisulphite Soda

without Electrode Very Mobile { Attached by O about 1/4 inch it grows here but resumes when Electrodes taken out & put back pbly depolarizes

143

3 Grammes Sulphate of Lithia

Mobile { Considerable movement towards O. say 1/4 at first dies out wont revive = Hg to O. assumes more globular form if touched with H assumes normal & more Mobile Condition

---

1 gram Hypo phosphate Quinine

Not mobile whole globule stick together ~~[illegible]~~ apparently stick to bottom dish

{ Is attracted very slowly by O. at least 1/4 inch after it reached near O. end becomes oxidized & which probably comes in end it retains than about 1/32 = ~~Hg to H~~ dont deoxidize it apparently & it has scarcely any mobility }

---

1 gram Sulphate Coffeine

Not very Mobile { attracted about 1/16 towards O. }

---

500 Mg Acetate Quinine

Not mobile Hg sticks together { attracted slowly & about 1/16 towards O = apparently oxidized = not deox. by H }

144

500 mg Sulphate Silver
Mod Mobile | Covered by Glock ox ~~A~~
not ~~de~~ oxidized by H = attracted
1/32 towards O. High Resistance p6g

---

5 grms ~~fluoride Sodium~~
Mobile | attracted slightly = more between
Electrode = Hg to O great agitation
with current & mirror upward
stop assuming more globular
mass assumes normal condition form
which covered with H

---

1 Gram Cerium
Very Mobile | Is greatly agitated
without touching with
Electrodes the almost alig
in few minutes gently drive to
something — Hg
attracted about 1/16 towards
O. if H + Hg drawn towards
one side of dish attraction is
positive =

20 grms Chloride Strontia.

Very Mobile + bright { Attracted by O. 3/8 ~~of the~~ Gap
Electrodes if it has been
previously oxidized a

15 grms Acetate Ammonia

Mobile { Attracted to O. 1/2 inch
assume more globules form when Hg to
O. touching H to it does
disturb it or resolve it to it
Mobile Condition = when
to O for instant + then put
to H. great Current set up with
a rise in Mercury of 1/16 ~~to~~ in a part
of it just on of a large bubble gas
was under it This dies away + comes
again just like a gas bubble

20 grams Acetate Strontia =

Mod Mobile { Attracted to O 1/4 inch
~~[illegible]~~ doesn't apparently oxidize
but assume more globules appear
+ [illegible] when to O. on touching
with H. [illegible] but of O. diminished & it put to H.
Current setup & bubbles apparently go under Hg + [illegible]

146

20 grams Benzoate Soda

Most Mobile { Spreads out like Caustic Soda & Potash = But not so much = many deoxidized by H = not much attracted by O, when put into it it turn scarcely at all) by O but was less globular all round when to H in closing

4 grms Bichloride Mercury

Next Mobile { Covered with black ox
No movement anywhere

5 grms Salicine

Mobile & Bright { Not attracted very much by O about 1/32 not apparently oxidized or deox

5 grms Chloride Barium

Very Mobile { attracted about 1/4 inch by O. oxidized slightly assuming slightly more globular form deox by Hydrogen

1 grm Baptisia

Most Mobile { attracted 1/4 inch by O.

147

1 gm phosphorist Calcium

Mobility Bright — it slips down to bottom disk when it slips it bulges out slightly in plane (B) not true spherical

Attached 3/4 cm O. mark when Hg & Ca moved up to side disk = appears to be constant attraction not gravity lines = dont oxidate apparently dont attract much bottom Electrodes =

5 gms Metals Zinc

Mod mobility do above

Attraction very slight Coward H O about 1/32 = H Electrode becomes Coated with black deposit

1 gm Sesquichloride Chromium (Precipitate)

Mod mobility

Attached slowly to O about 1/2 mm of Hg kept around 20 or 30 seconds = 9 sec by the parabola of Sesquichl = that the gas or current proceed from the Hg to H in bottom toward the O. There no doubt but the reason that Hg spread is that the path Coward O is Lubricated like the EM Hg =

148

1 grm Sulpho Carbolate Lime =

Mod mobile { Phenomenon = with Hg to H. it attracted forward O ~~and~~ should out greatly it stops for a moment ~~that~~ breaks into 2/3 = going to H. & 1/3 to O - it a grm should out & come together again breaks & so on —

1 grm Carbozolate Ammon.

Many coloured with high oxide brown all mobility flatten out & can be moved as a body ~

When to O spreads outflat but not so much or so fast as with the alkali: it is somewhat deoxidized by H. but not all by it

1 grm Chloride Lead —

Not very mobile { Covered with black Oxide: Scarcely attracted by O. Say $\frac{1}{100}$ —

149

20 grammes Chloride Barium -

Mobile { Phenomenon there is a deposit
Moss like that shoots out like
Tri = on the Hydrogen Electrode
This deposit I believe is
an amalgam of Mercury
+ Barium if so it is an
Exceedingly Cheap way of
procuring it = its deposited
in large quantities, attention
moderate towards O
(used to heat amalgam, on platinum spatula, [illegible])

5 grams Acid Tali Urinum + Potassi

Not mobile. | attended 1/16 by O.

500 mg. Picrotoxin

Mobile + Bright { Nothing much

5 grms Pyrophosphate Soda —

Very Mobile
+ Mag H

attracted 1/4 inch, but
bottom Electrode great
deposit = colour to O
it is Coated with H.
great agitation Mirror x
then stop until again
lowered

---

20 grams Tartrate Iron

Mobile

Nothing Much Thick
thin amorphous formed on H.
on Hg & Fe =

---

5 grms Benzoate Ammonia.

Mobile

attracted to O. 3/4 inch
spreads out like the alkalis,
but not so much as Benzoate
Soda deox by H.

---

1 grm Citrate Magnesia

Mobile

its attracted 3/4 inch by O.
and stretches out in thin wire
breaks at equivalent 2/3 ds going to H
1/3 to O & so on —

20 grams Acetate Zinc =

Mobile { Scarcely perceptible if anything attracted to O.

5 grams Gallate Ammonia

Mobile = { attracted 1/16 to O.

20 grams Ammonio-Citrate Iron =

Mobile { - attracted about 1/16 by H_4O.

1 gram Lactate Iron =

Not mobile. Moves as a whole apparently bound together by an oxide { Scarcely a move.

1 gram Chloride Morphia =

Mobile { attracted towards O about 1/16.

20 grams Iodide Sodium

Mobile { Assumes new globular form to O. between Electrodes. attracted 1/4 inch to H. loss, owing deoxidized by H

20 grams Oxalate Potash

Mobile = to O. it oxidate peculiar the oxide having a Metallic appearance like back of a Mirror, many deoxidized by H. = between Electrode 1/4 inch dilution

---

20 grams permanganate of potash

Mod Mobile { Appears on O like Alkali. & about as much poly permanganate is decomp - with free Na = 9 notice that it is not deoxidized with great rapidity & when it is at 1st becomes black, then great volume of gas given off. meaning = what is the gas? 9 also notice that the gas is given off Edge of globule nearest to the Oxygen Electrode in the Solution, gas goes upwards. =

---

20 grms Acetate magnesia

Mobile { although slightly = 9 notice only Hg to -H. Gas given off copiously

1 grm Tribasic Magnesia.

Mobile | Attracted towards O 1/4 inch

20 grms Chlorate Soda

Very Mobile | Grains very globular on O. deox by H. attraction about 1/16

20 grms Bisulphate Soda

Mobile | between Electrodes scarcely any attraction but on closing the circuit in top Hg was jerked towards H but gave back on opening the jerked towards O. = In fact globule itself on closing jerked towards H + then returns to be jerked towards O on opening = attracted by O slightly

10 grams Chromate Potash

Loses all mobility spreads out | spreads out more on O. partially but not wholly deoxidized by H. = probably could be with longer electrolysis

154

1 gram Arsenate of ammonia.

Mod mobile { attracted 1/32 by -O = Self Vibration

1 gram Phosphate Lime.

Mod mobile { drawn slowly 1/4 inch towards O. but when key worked moderately quite only 1/8th inch

5 gram Hypophosphate ammonia.

Very Mobile { attracted 1/2 inch slowly to -O. With Electrode but not so much, about 1/8 inch.

1 gram phosphate magnesia.

Not very mobile { attracted 1/8 inch by O. but scarcely any between Electrodes.

155

1 grm Tungstate Ammonia

No mobility
Neither in a vacuum

Oxidized by O. & partially deoxidized by H.
Scarcely any movement

---

1 grm Creosote.

Mobile & Bright

Attracted about 1/16 of inch = moves quite quickly backwards —

---

20 grams Acetate Lime —

Mobile

Attracted almost inch = either Oxygen or ~~Hg~~ to H = it also splits and makes long Vibrations 4/5 going ~~to H~~ & 1/5 to O. then Coming together again to 1 m

---

Very Mobile

3 grams Sulphate Aniline
Attracted slightly = Hg to H
Bubbles covered with gas H

156

5 gram acetate Cobalt

mobile | No attraction

1 gram ~~Salya~~ Salicylic acid

mobile | attracted to O about 1/16

20 gram Proto-Chloride Iron

very mobile | slight attraction to O

20 grams Iodide Barium

Mobile | attracted slightly by O.

Not quite mobile | attracted slightly by O.

20 gram Anthracite Palach

Just mobile | Flattens out O like the alkalis [illegible] 100 x dyed by H = attracted [illegible] by O.

500 M.G. Hydrate Chloralis

Mobile | Hg Restless without Electrodes
attracted about 1/4 inch
by O if Hg & H. is taken
up to side of Cup

---

1 grm Sulphate Betarin

Not very mobile | Nothing much

---

20 grms Nitrate Lime.

Mobile at first | by Oxidation loses Mobility
Scarcely any attraction

---

20 grms Chloride Zinc.

mobile | Scarcely any if any attraction by
O = But on closing it is
first repelled for about 1/100
of inch from H then attracted
1/64 by H

158

10 grms phosphor. Wolframic Acid

Very Mobile & bright = | Colored Blue. by O carefully
exposure by Oxidation
form beautiful Blue salt

Mercurigate =

20 grms Iodide Cadmium

Mobile | No movement

Great Hach Hach

1 grm Phloroglucine =

Notably Mobile | attracted to O. about 1/16 =

20 grms Tartaric Acid -

Quite Mobile & Bright | attracted only 1/16 = Hg to H
gives off bubbles. -

159

20 grms pyrolignéous acid

Exceedingly Mobile & Bright { attracted only slightly

20 grms Chloral Hydrate

Very Mobile & Bright. { rolling round

20 grms Lactic acid

Very Mobile & Bright { Scarcely attracted G.O.

200 M G Molybdenic acid

Not Mobile Movements slow { Scarcely attracted from its coated with oxide before put Glid. in with Hg to O mus oxidized not to any great extent deoxidized G.H.

10 grms Chlorate Magnesia. Solution full crystals but its Very powerful

160

Experimental Notes
J. Ong 21st 1877

Platina - Solution

No 1

Platina Solution Jany 21st 1877.

Take Oulein oil 1 Part Acetic Acid 1 part and a few drops of Sulphuric Acid reduce it down with about 10 times its bulk of water and you will get a nice green mark on Oxygen

a little more Sulphuric gives a Blue mark not

[illegible] fixed cyan Potash makes a very [illegible] solution

[illegible] gives a dirty green

[illegible] mark and [illegible] gives a fair mark

[illegible] changes the color of the mark to a

[illegible] I think makes the mark more

[illegible] delicate I think the mark will

[illegible] Williams

161

~~Nitrate~~ of Uranium of Potash dont do it any good
Acetate

Chloride of Lead very delicate but fades very quick

Bromide Potash kills the green mark

Cromate Potash turns the solution greese
Blue mark on a. Perhaps [redacted] Permanent

[redacted]ngnate Sodium no change in solution
the green mark

[redacted]
iron no change
Perm[redacted] mark
Zinc no change
[redacted]
[redacted]ate Soda almost kills the
[redacted]nge in solution

[redacted]s change
[redacted]nia kills the green mark
Brown

[redacted] Cromcim no change Permanent
[redacted]

Oxalate Soda no change

Cyan. of Silver No change in solution
gives delicate mark on J. Slight m[illegible] on
H. on Platina only

Bi Carbonate of Potash no good

[illegible]ate of Potash Kills green mar[illegible] [illegible]ating
[illegible] No Change in the a[illegible] on [illegible]
solution

[illegible]mple Changes Solution. [illegible] milk white
[illegible] mark more delicate

Sodium no change

[illegible] Kills the mark

Makes the Solution
[illegible] a green Blue mark

Chlorid Sodium What this is

Ammonia Citrate Iron turns Solution
brown mark not very delicate but comes
out a bright green afterwards

[redacted]

Nitrate of Lime no good

Anthracate of Potash no good

Glycerotricine they dont mix
no good

of Ammonia [redacted]
no good

Sodium no good

ronticin no so delicate gives a
but turns green in time

no good kills the mark

dont hurt the mark
hat it does it any good

Chloride of Ammonia
kills the mark altogether
good for ink

Boracic acid dont appear to
affect it in any way

Acetate of Lead makes it less delicate
brown mark at first turning green
short time

[illegible]lic acid kills the mark dead

Iron gives a deep blue mark
[illegible]ing to a green dont think it
[illegible]manent try again

[illegible] alt dont appear to do any

[illegible] makes it very delicate
[illegible] green mark the best of
[illegible] yet. Turns the solution
[illegible] mixed a few minutes

permanent

165

Jany 24th 1877

[redacted]

Nitrate of Silver very delicate and a very deep green mark very neat as good as Lunar Caustic

Nitrate Strontia almost kills the mark

Nitrates Ammonia no good

Magnesia no good

ramic acid good for mix

nesia kills the mark right out

[redacted]

now very nice mark not Permanent

mark fades no good

good old first Chloring

but when dry

166

Nitrate of Lead dont appear to do any good

Aniline Red in a solution of water & nitric
Acid added to untill it destroys the red color
a little of ~~this~~ the acetate of Aniline & to the acetate solution
gives a violet mark on short circuit and a
green mark on 10.000 ohms
very delicate solution try this again

Acid dont mix with Aniline

Oil

Butyric acid dont mix with Aniline
no good

Hypophosph acid dont mix with Aniline
no good

Oxalic acid no good

Yantar's [illegible] makes tartrate of Aniline which
is soluble in water it gives the green mark
same as Acetate & Sulphate & Nitrate but
not quite so delicate nor so Permanent
as acetate with a little Sulphate

Gallic Acid no good

Citric Acid combines and makes Citrate of Anilin is not very delicate. Wanted to experiment

Some more on this

Jany 25 1877

Tungstic acid with a little Sulphuric acid gives me a green mark on O. But I dont think that Tungstic is at all soluble And the mark is due to to the Sulphuric alone

Chromic acid no good

~~Hy~~ Hyphuric acid no good

Camphoric acid no good

[illegible]nglic acid dont mix with anilin

[illegible] a little Sulphuric acid it concentrates

and [illegible] ball that dont appear to be soluble [illegible] or only a small part of it

Phosphomolybdic acid with a few drops of Sulphuric acid forms a salt soluble in water gives a green mark on O and very delicate and I think permanent

Valerianic Acid and a little Sulphuric combines with Aniline and gives a dark blue mark but soon fades to a Brownish gray are very delicate water in excess Blue mark turns ~~[illegible]~~

use a solution of Acetate of Aniline with other Chlorides for conductivity

Nitrate Soda no good

[illegible] copper does not improve I say

Lithium [illegible] delicate turns solution clear

Aniline Red with Nitric Acid makes the Aniline Solution less Delicate for mark with a tin pen

Chloride Lime turns Solution blue no mark

Bi tartrate Potash very good

Phosphate Manganese very delicate on 10 000 ohms but fades out

Protochloride Palladium it dont mix with the Aniline Solution nor can you Boil it but by Putting a Strip of Paper in to tube you can boil it easy but they dont mix the lower Solution gives a green mark Permanent but not over delicate by Again

Hydrocyanic Acid dont improve it much but makes it more Permanent

Sulphuret Potash no good

170

Wood Naptha very good to 11.000 ohms but fades slightly by Heat

Bromide of Mercury no good

Carbonate Amonia no good by putting the two [redacted] Electrodes in to the solution turns it blue no mark

Protochloride of tin no good

Gum Arabic no good

Chloride Calcium this solution will only mark on high resistance. It gives nothing on short but as soon as you take out 8000 ohms gives a first class mark. damn funny

Jany 28th 1877

[redacted]

I think the best solution found yet with Platina pen is Aniline oil (standard) Acetic Acid. Small amount of Sulphuric Acid and about 10 times its bulk of water and add to this a little Iodide Potass which makes the solution very delicate the Iodide ~~Cyanide~~ mark will fade away. And there will remain a greenish yellow mark which is Permanent

Jany 27th 1877

Take a solution of Aniline Violet and the standard to this add a very little Nitrate of silver and you have a very delicate solution giving a mark through 30,000 ohms with 3 cells carbon it is a Permanent green use standard without Aniline Violet only and the silver green mark on clothing but turns black this solution is very delicate gives a mark on 80 000 ohms but I don't think it is quite so delicate as the first-mentioned

172

Standard Amem Violet Silver

Standard Metric Silver

173

Ethereal force Feb 14th 1877

20 grams 100 cc H_2O Ferrocyanide of Potash Decomposes it and forms a salt shaped like a brass mesh

Trial the following kinds of Electricity to do the same thing

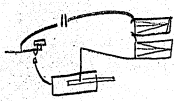
1 Cell Carbon through 200 ohms coloration on H
" " " ditto on O.

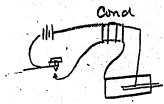
1 Cell Carbon through 600 ohms " H
" " " O.

1 cell Carbon through 1100 ohms " H
" " " O

1 Cell. Carbon through 1200 ohms slight H
" " " O

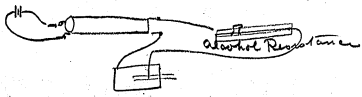
1 Cell Carbon through 2400 ohms nothing H
" " " O



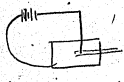


treat the above with strong potash in a solution of ferrocyanide of Potash get a small spark and coloration on paper

one cell Carbon get no spark ~~one~~ but get a slight coloration both on H X O.



made it very weak so that I would get no spark slight coloration on the paper



Bichromate of Potash on dead short Ch — O two to Pend gives a kind of red mark after dusting on paper for 15 minutes on H. a kind of White mark it dont appear to be anything of the same nature as others decomposition

Nitrate of potash excess carbon
on short ch — O nothing H nothing
James Adams

---

trying to decompose different chemicals
with different metals by Etheric force
Feb 15th 1877

20 gram 100 c.c. Ho.
Lactate of zinc
Iron Pen down nothing
Iron " up nothing
Lead " up Lead mark — nothing
Lead " down —
Nickel — down Nix
Nickel up Nix
Silver down Nix
Silver up Nix
Zinc down Nix
Zinc up Nix
Aluminum down Nix
Aluminum up Nix

176

Sulphate of ~~Cad~~

Cadmium 20 gram 100 cc H_2O,

Aluminum	down	very slight coloration
"	up	
Iron	down	Nothing
Iron	up	Nothing
Lead	down	Nothing
Lead	up	Nothing
Lead	down	Nothing
Nickel	up	Nit
Nickel	down	nit
Silver	up	Nit
Silver	down	Nit
Zinc	down	Coloration with or without Ethere

Ferrous Cyanide of Potash 40 gram 100 cc H_2O,

Iron Pen down gives a blue color and forms a salt with or without Ethere

a solution of salt & H_2O with an Iron pen gives a blue color without Ethere

With Ethere it gives a blue mark and forms a salt

ferrid Cyanide of Potash

Lead Pen. down Blue Coloration
Lead " up — — — —
Nickel down nothing
Nickel up — nothing
Silver down gives a yellow salt —
not in the form of a bucs nest but —
that might be owing to the shape of the pen
but it shows a solid mass
tried it without Et Rye but could
get nothing
Zinc down forms a kind of a salt —
looks like Iron one
Zinc up ditto
Aluminum down nothing
— — — up nothing
My Jungotate of Soda 5 Gram 100 cc H2O,
Aluminum down nothing
" up nothing

Tungstate of Soda

5 Grams 100 cc H2O

Iron pen	down	Nothing
Iron pen	up	Nothing
Lead	down	Nothing
Lead	up	Nothing
Nickel	down	Nothing
Nickel	up	Mix
Silver	down	Mix
Silver	up	Mix
Zinc	down	Mix
Zinc	up	Mix

---

20 Grammes 100 cc H2O

Chloride of Nickel

Zinc	down	Nothing
Zinc	up	Nothing
Aluminum	down	Nothing
Alu	up	Nothing
Iron	down	Nothing
Iron	up	Nothing
Lead	down	Nothing
Lead	up	Nothing

James Adams

Feb 18th 1877

Hydrate Potash		20 grain 100 cc Hₒ
Nickel	Down	nothing
Nickel	up	nothing
Silver	Down	Nix
Silver	up	Nix
Zinc	Down	nothing
Zinc	up	nothing
Aluminum	Down	nothing
Aluminum	up	nothing
Iron	Down	nothing
Iron	up	nothing
Lead	Down	nothing
Lead	up	nothing
4 grain 100 cc Hₒ	Bi Chloride	Mercury
Lead new	Down	nothing
Lead	up	nothing
Nickel	Down	nothing
Nickel	up	nothing

Silver Down Nothing
Silver up Nothing
Zinc Down Yellow coloration
~~Zinc up~~ gives a dark coloration
Without Ethers
Aluminum Down Nothing
" up Nothing
Iron Down gives a Black coloration
get the same mark without Ethers
Bichromate of Ammonia
20 Gram 100 cc H_2O.
Lead Down nothing
Lead up nothing
Nickel Down

20 grams Oxalate ammonia

40 Caustic soda

1 gram Nitrate of Strychnine

182/8

182

Merlo Laboratory

Jany 23. 1877

No 5

El Dr. Jorge Mercado

J. Cobarle

Continued

5 grms Sulphuret Calomel

Not Mobile | Hg to H spreads out = attached slowly by O, slowly deoxidised by H.

1 grm glycerolmel.,

Not very mobile | attached 1/8 inch by O.

20 grm Ag2 quadrilateral 2 grm

Very Mobile | attached almost as much by H with O to Hg as the other way = Mercury (that adhers) to O plate ~~[illegible]~~ turns black peel off

20 grm Sulphuret Copper

Globules & Mod Mobile | Phenomena attached by H only

5 grms Gum Tragacanth

Mobile

attracted 1/4 inch by O
when Hg & H on side dish

5 grms Arsenous Acid

No mobility = Spreads out
flat & gives no movement
whatever with Electricity

20 grms Oxalate Ammonia

Very Mobile

Attracted by O. inch -
attracted by H. 1/4 inch

forms a ammonium amalgam
Swells up greatly = doesnt
move very greatly but Electricity

184

5 grms Calomel mul sulphacum

Not very mobile | attracted 1/16 inch by O.

1 grm Caustic K 25 grms gum gamboge

mobile | attracted 1/2 inch to O.
doesnt spread much but oxidates
with O to Hg —

1 grm Caustic Pot 5 grms Venice Turpentine

mobile | Swims a brave

20 grms Sulphide of Antimony

Not very mobile not spread | attracted to O about 1/8 inch

20 grams Metallic Lead

Phenomenon before touching Electrode

black oxide accumulate which moves with
[illegible] and accumulate in a heap on
top of globule

over

this oxides before it reaches the top of the globule looks like Metallic Lead =

Moderately Mobile | Not attracted by O. a little by N

---

5 grms Gum Benzoin 1. Caustic Soda.

Mobile | attracted 1/4 inch by O

---

5 grms Shellac 1 Caustic Potash.

Mobile | attracted 1/4 inch by O

---

5 grms Glycerine

Mobile | attracted 1/8 inch by O
Stiff mix & break

---

5 grms Caustic K 5 - Balsam Tolu
acts like same Potash Solution

Mobile

40 grammes Caustic Soda

Funny this solution instead of flattening out as it should doesn't much but acts very funny its scarcely attracted by O.
but greatly by H spread out 1/2 inch = when it is say it respond to more better than any gas seen
when diluted it spreads but promptly

Hydrochloric Acid strong
attracted by H only
about 1/4 inch
bubbles copiously given off
Hg to H. oxidizes
in every shade with Hg to
O it is blackened by bringing
H near globules by the hydrogen

Model

Nitric Acid, Shaking
When first poured in
divides the Hg up in snake
like parts which wriggle
around & finally are
attacked so showing that Cant
see the Hg = passing Current
either by O or H don't stop
the reaction except near the
end when O to Hg stops it
slightly

1 grm Bi Tartrate Potash
Not much good

Metals

1 grm Benzoic Acid
Not much good

Excellent
Metals
to Bright

188

5 grms Balsam Copaiba
1 grm Caustic Potash =

Mobil. | attracted at first 1/4 inch to .01 = goes greatest distance between Electrodes

---

5 grammes Phosphate Manganesi.

Mobil | attraction great = 1 inch or more only 1/8 between Electrodes = Oxidizes slightly with Hg to .01 but many deoxidized by H

---

5 grams Microcosmic Salt.

Mobil | ~~spreads~~ attracted as much as above & between poles it spreads fearful at least an inch this ought to be good for the pumping action in Capillary Tube Quality

189

1 grm Acetate Strychnine

Mobile | not much good

20 grm Grape Sugar

Mobile | not good

Monochloracetic acid

Mobile | not good

Lacto-phosphate Bismuth

Mobile | not good

1 grm Perchlorate Potash

Very Mobile assumes very globular form with Hg to O. naturally rising by Gravity to H. attracted slightly by 1/2 inch. Not near so much but pull. O.

190

20 grams Iodide Zinc

Mobile | Attracted same distance 1/32 inch both by O & H

Very Mobile | 1 gram Chloride of Propylamine — Attracted 1/2 inch by O. none by H. between Electrodes not quite so much varying

---

10 gm Hyposulphate Barryta — Notably Mobile | Attracted 1/8 by O. but 1/2 between Poles — Barium Hg-Amalgam formed on H Electrode - plentiful

---

1 gram Iodide Arsenic

Mobile | not much movement — if globule allowed to roll above solution it gets a mass which shows most beautiful brilliant Color by heat (10) after the hand and sensation

5 grams Sulphate Uranium

Mobile	Not much good
Mobile	Unknown quantity Per Nitric Gra. U 9
Exceedingly Mobile	1 gm Nitrate Strychnine Attached 1/4 inch by 8
Very Mobile	1 gm Iodic Acid Attached slowly about 1/4 inch by ++ only
Not Mobile	1 gm Chloride Uranium Attached to O about 1/8 inch

1 gram 400 mg

Luna Caustica.

Not very Marked

Blackens Hgs =

Scarcely any attached by O

1 gm Sul Cinchonidin -

Not marked

Slowly attached for 1/2 inch by O.

1 gm Daponin =

Not very marked

Not very good

3r gms Chinic acid

Marked

Not good

3r gms Vdicinate Potash

Marked -

Attached 1/8 by O.

Got better Got Pali

20 grms Iodide ammonia
forms ammonium amalgam
in large quantity + syrupy

20 grms UVic acid
not much good. Matter
that the scum on the
top of Hg moves +
responds with rapidity to
Magnet, this forces matter in
many Solution = probably
best movement could be got
here with light aluminum
point horizontal with
pipe or cork disk resting
on Hg would go. more
pressure get electric
points.

18 grms Valerianate Potash

Mobile | attracted 1/2 inch by O.
When Hg to H by holding
O near Hg there is a
raise in mercury which soon
undurns to H when it
bust out sidewise showing
it is gas

That's all the
solutions of the
100 cc

Chloride ammonium
from an amalgam
its attracted
3/8 inch by 1/4 t

Nothing that phospho-wolframic acid gave a sky blue Calomelan with one of the Hg globules = I now go to work to ascertain what was it that gave the Calomelan whether a poralloxide of Hg or something in the Hg by analysis =

Nitrate Hg + P.W. acid clouds = Nitric acid redissolves =

Bromide Hg – no.

Bichloride Hg – no.

I now take a fresh globule of Hg + pour phosphowolframic acid on it again the blue Calo appears

~~Not~~ Cyanide Hg – no.

Thinking it might be Zinc

in the Mercury

Sulphate Zinc — no
Acetate Zinc
Valerianate Zinc

Pure Phosphor doesn't reduce Phospho-W acid to a blue.

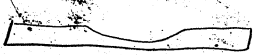
If globule Hg is put in test tube with the phospho-W acid & shaken liquid turns blue & more its shaken bluer it gets = if much water is used it almost destroys color = this shows that it is the oxide of Hg or something in the Mercury

I have found it = its Zinc with Mercury - which has a little acid in it left over from amalgamating the Zinc at first.

Fresenius says: a phosphoric acid solution of an alkaline Tungstate (10 wolfram) gives a beautiful blue with Zinc = I found it so = this is a good test after Telegraph people burning Hg

Curious Experiment on Mercury globules =

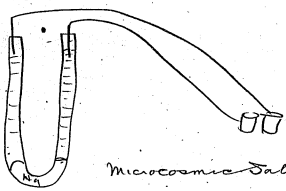
Carbon plate with hollow cut in it



The Hg in 20 grm. Sol Caustic Soda. without Electrodes keeps up a surface current with coloured rings. They have continued for 10 minutes & will play continue long time nothing very strange Ace

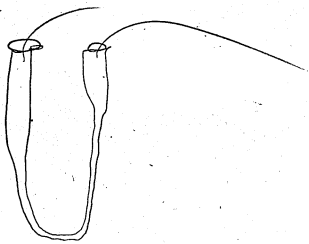
With Hydrochloric Acid nail
change =

I now have a bent U tube.



Hg moves towards Oxygen Electrode
about 1/32 of an inch on closing
Key = It rotates too Easy to work
Mercurwell = diameter bore
tube about 3/16 =
I notice that the water passes
freely from one tube to the oth
between the glass & the Hg

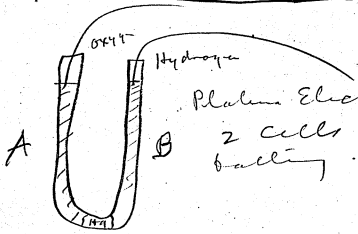
I have now made another Capillary tube



with considerable Hg & copper electrodes it is easily moved with platinum moves much better but not so well as in flat dish I got less Hg in now

The tube I drew didn't answer well = gone back to U tube 3/16 bore small Hg in bottom + SO_3 + H_2O, dilute =

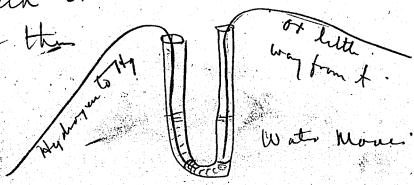
Thus



Platinum Electrodes
2 Cells Carbon
boiling

Through 10000 ohms water
moves in A. $\frac{1}{200}$ inch & flowers same
rate in B, it responds good
to Morse ⊤

With the U tube & with
Hg the



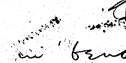
up in A & down in H. $\frac{1}{100}$ $\frac{1}{64}$ to $\frac{1}{32}$
inch quite sharp through 24000
ohms with 1 Cell Bunsen

It dont work at all with reverse
Current the reverse Current
or O to Hg sticks it &
it dont recover for several
minutes ~~with~~

~~By the way, I have [illegible]~~

~~Yes~~ If it had a capillary
bore it would move
along distance =
SO_3 + Water dont act
anywhere near so well
besides this aint pure
Hg there's lot Zinc in it

I find that with the tube 3/16 bore
that with 2 cells Carbon it moves 1/64
through 36000 ohms = it moves sharply
& plainly through 70000 ohms = $\frac{1}{100}$ of
inch = With magnifying glass
magnifying double it moves
plainly about $\frac{1}{300}$ inch through
70000 ohm with <u>one</u> cell
Carbon battery = this above with
5 grams <u>solution</u> phosphate Manganese

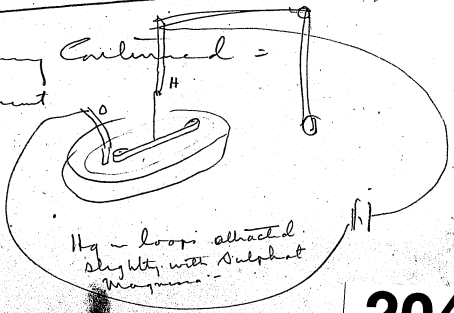
Been trying RO_3 = & 40 grams Rubbish
Magnesia = but there no doubt
but 5 grams phos <u>Manganese</u> is
best = I find that when
the Hydrogen wire is made
in a loop.  this & dipped
in Hg in bend of tube and drawn
up as far as Hg will adhere
without breaking that the water
rises & falls a great distance
hence weight more sensitive. This puts Hg
on a tension =

Deustmann. Shange Co say appears to measure as the O. wave is ~~not~~ just pit in liquid =

Note = acetate aniline, + solution perchloride palladium in test ~~tube of liquid~~ tube. two solution dust mix – if heated, a large bubble 1/4 diam comes up from bottom solution occasionally with a thump. but if pieces Bibline paper be shade in Enormous amount gas comes up and liquid boils = this shows that two liquids are above other or liquid that boil by jerks. Can be prevented by a biblus paper, or other substance connecting bottom with top.

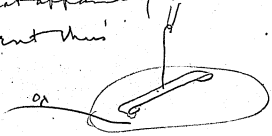
Mercury Cathode =

Experiment

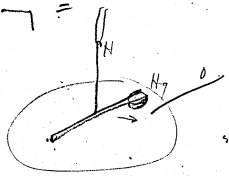


not attached with Solution 20 grms Caustic Soda & with 5 grms Phosphate Manganese not apparently attached. =

but this



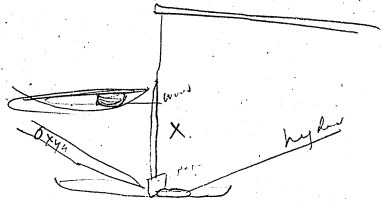
it takes. (18) when ckt. closed the Hg in loop is squeezed so to speak out & reaches to bottom drop & on bkg ckt is drawn up by analogy Capillary =



on 1800 ohms 2 cells it attached by 0.1/16 inch = the globule hg in bottom drop but

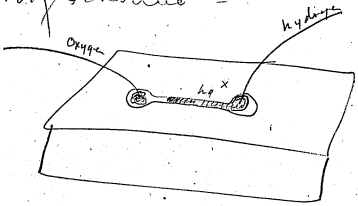
3000 ohms makes $\frac{1}{64}$ 6000

Ohms $\frac{1}{200}$ = 2 cell Cabr



with 5 grammes solution phosphate manganese
paper moves 1/64 inch through 12000
ohms —

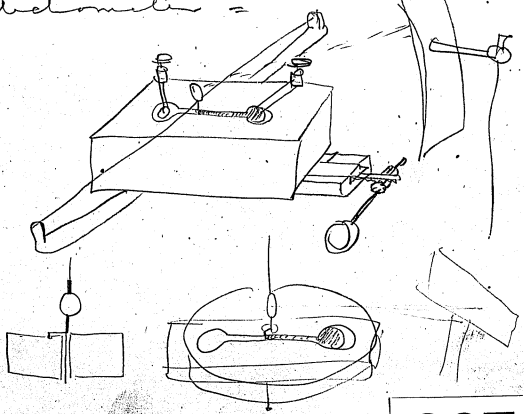
Very Sensitive —

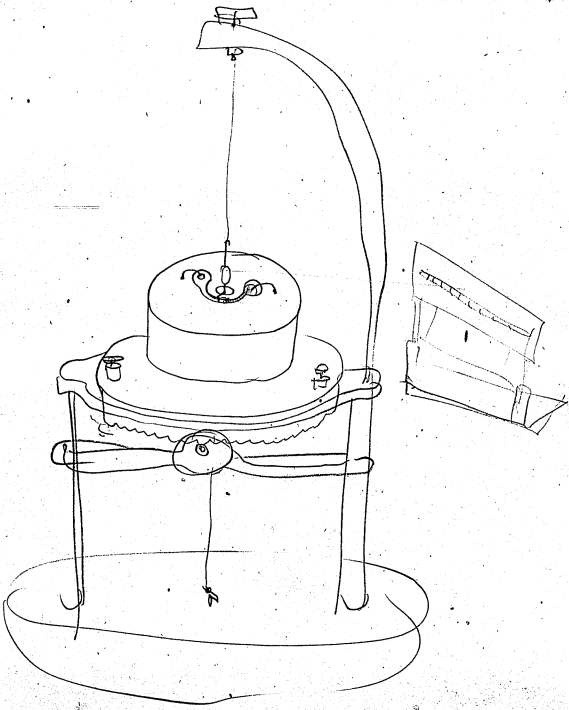


groove cut in paraffine about 1/8 wide &
about 1/8 deep. Connect ▭ this
with rounded part at each end
with 5 gram solution of phos
Manganese; end of hg. X. is allowed
towards O. with 2 cells Carbon

$\frac{1}{64}$ inch through 70,000 ohms
& $\frac{1}{100}$ with 1 cell through same
resistance: Thus scarcely any
solution in bottom cant see any
just manat poly if too much
solution not so sensitive,
the long tail of the Hg must
be manipulated for sensitive
& can get no movement.

I propose to make a Mirror
Endometer =





When a saturated solution of acidulated of manganese (it may be neutral manganese possibly something else must test it) is used as an ink on hard writing paper the place where this solution touches the paper it swells up greatly fully the thickness of the paper & suffices to lift a circuit closing lever & do work with a battery = We employ it now in our autographic telegraph experiments to open & close the circuit by moving the lever on the Emq principle (Le) by the difference of friction between the rough & smooth paper & the smooth & glazed surface

We tried the following but none so good as the acidulated manganese –

Glycerine & No – No good

Acetate Mercury acts somewhat like Acetate Mercury but not near so good

Nitrate (Lead) + Bismuth dont raise but surface paper a little rough.

Prussiate Iron - little better than lead. surface rougher

Ferrocyanide of Iron very

Phl Barium fair.

Acetate Hg & KO, nearly as good as the Acetate Manganese

Sulphate Aniline & Sulphuric Acid

[illegible] g [illegible] d

Ferrocyanide Copper very

Chloride Zinc, not quite so good ~~as~~ standard & has disadvantage taking long time to dry - whereas the standard dries immediately

Acetate Lead neg

Black Flux + HO neg

Oxide Copper - rubs off neg

Bichloride Tin neg

Oxide Copper + Gum Dextrin fair.

The Standard is perfectly satisfactory & we now are trying to obtain a dye to Color it with so as to make good [illegible] ink

We have been trying various Inks & Experiment to make

porous papyrographic paper. We find that the acetate of manganese is the best, if you use a moderately thin hard writing paper in with the strong solution of acetate

of manganese it does not go through but if after drying it be dipped in water

with the working down
the water comes through
almost instantly then
by using the glycerin aniline
shellac ~~gu~~ for copies may be
taken

glorious sunshine by
all the
house are in the days
orian used
warm of the
aged man

The above is a specimen
taken in this way.
If a piece of bublin pap
be coated with a

one side or both sides
~~[illegible]~~ with a thick solution
of Shellac & then written
on with the Manganese
Oxide & soaked in Water
It makes a beautiful
Stencil. You must keep
printing with all the
[illegible] of our discontent made
glorious summer by this sun of York and
all the clouds that lowered upon our
house are in the deep bosom of the
ocean buried [illegible]

Manganese [illegible] ink Stencil
[illegible] it dries &
[illegible]
glorious summer by [illegible]
all the clouds [illegible]
house are in the deep bosom of the
ocean buried [illegible]
the Stencil cases to be
proof but may be soaked
again with Water

the use nor nitric in the
glycerine ink & its the very
Unchecked glycerine, perhaps
if water were used it would
give splendid results.

We have a pen & ink & water
proof tissue paper sold by a
man in Connecticut that
with the manganiferous ink
works well. the head of the
pencil is [illegible] fitted with
it = must be soaked
in HO = 9 parts that hydrochloric
acid dont do well but mixed
with acetic works well
the proportions ought to be
varied & further Experiments
made

Conceived idea of working with a gum mix + then dusting it over with fine gritty substance, passing through roller the idea being that gritty stuff would break through paper + form a stencil. Tappia Cork would. I thought it ought to be run through Metallic Roll with great pressure.

Caustic Potash, Soda, Barium or Strontia Salt act near as well as Chalk Magnesia

I think that is the
Manganese Acetate ink
mass etc. are up so high
it might be used for the
Blind in Correspondence ?

Hydriodic acid gets right
through the paper in [illegible]
but good ink [illegible]
Aniline ink [illegible] though
Smoked [illegible] Carbolic
Calcish [illegible] a Valuable
Iodide [illegible] —

217

The Battery was so strong
That it ~~was~~ Burnt the Land

[ITEM FOUND IN BOOK]

With this [illegible]
Contributions
thicte shell me
& their in
white
Hemingway [illegible] [illegible]

Now is the winter of
our discontent made
glorious summer by

Now is the winter of
our discontent made
glorious summer by

57 E

225

This is
James Adams

adjust it
last have bell.
Sheak Lower

copper band too
Mark
as it on the ribbonwire
am a w better
make a tin for lind if
Maccoa the copper

8
2 3 0

230

I it mepeaf just
as I can
the band in front of the disc and gummed
to rubber ~~dappragm~~ will do it the last you
pend. come load and heypra do it again
make band e so it will be flexible
good talk some more Nothing
not hing
not cubent got nothing
~~I go~~ got nothing
no yes first part total last
part too total
yes
Allright. Now i will i will go get
spa. come ~~Dapper~~

231

ther go — the shunt

~~is the matter~~

231/8

ap piles of folks in y and

a big crowd in every day

~~yes sometimes when a d as d it~~

~~comes p id~~

Nod no Tyou better

put the parchment of

rubber over the diam mean

put a d of the lead

~~Read you R~~

yes

You mean put on shunt

the big diaphragm

Best yet de

Best yet can read c follow y

it is touching
no thing
I have made a thinner rubber and
you is putting lead on it B
be ready in a little while
the Rubber Has got so small a surfase
that it has to be put on Thick or I cannot
get any current through it
~~put on all the Battery~~
Put on all the Battery
Have you got any Battery
on this wire when I cut out
my Battery
how lo
talk low. have
no thing you got it straig
ht
got nothing lah
time.

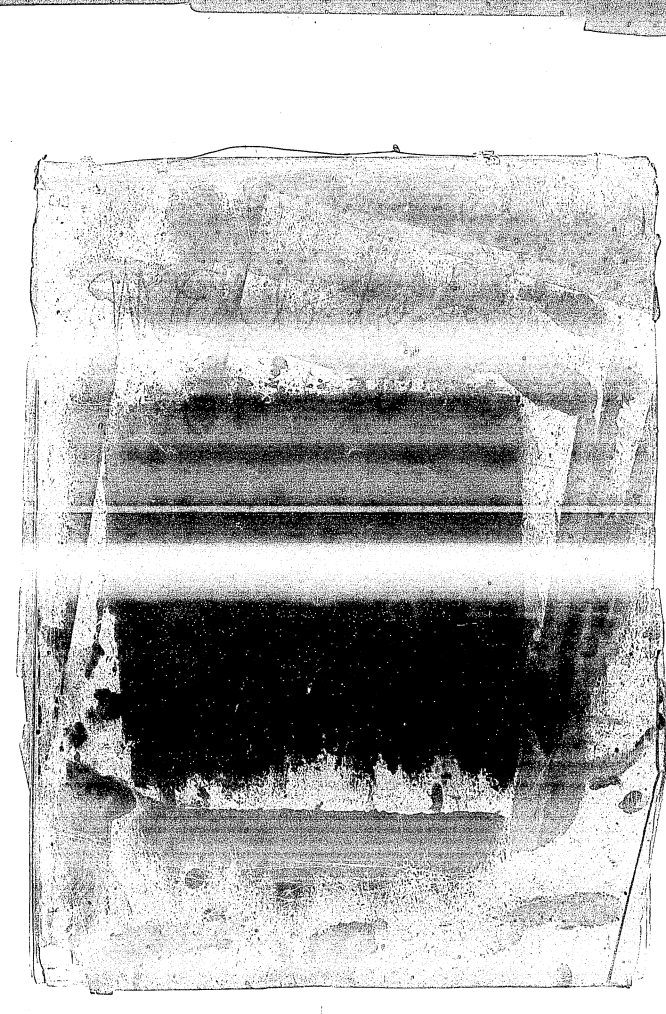
No ramrod talalaa it ax
the matte

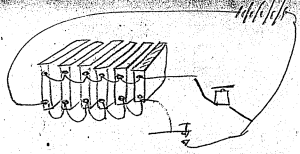
232

We have 60 cells of Calcium & we are making 20 of the carbon. —

O.K. We wont be over to night so you might
yes you can see
how long wo you be ready it is go going
to fix your battery the big dam

lo close
lo far put it closer and get the
ghl the rubber straight
o the arm in of mare ver
good si-sing
Im sung the ach
What
vilclose r
ohennot hom g.
Battery is to strong Burned uh Im for
put on 1 or 2 cells or a few
carbon
the Hertoo it se
c it is better but to close

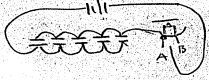




Callaud battery
70. cells.
not first class

5 Phelps Condensers. M7. 1.9 Capacity +
the red condenser = 1.6
2.5
1.6
1.6

on closing battery key, a current (momentary) closes sounder. (Bunnell) on opening an opposite current closes sounder: this is correct as on closing a route is formed for discharging the condenser on opening both poles of the battery are free to charge the condenser.



Phenomenon, on closing on-a + not through the sounder. The spark (snap) takes place with contact only on closing fuse on B it

does not scintillate and you get the steady
Electric Arc without scintillations only the
opening - why - perhaps Self induction
of the magnets =

We are now adding Condensers and battery
got 110 cells = with hand Malograph & I
notice that with Copper wire
Aluminium gives brightest
sparks & that + Lead gives Loudest
Cracks = With non the spark shows
Scintillation ~~[illegible]~~
closer together ~~than~~ &
more abundant & larger =
appear thus

While Aluminium shows less
abundant and there are mixed
sparks some appear like iron &
others are thick & bright. while iron
are thin & yellow = these bright
Scintillation are in the Ends
being turned down

the iron also have (10) some of the scintillation a forked end =

Nickel Zinc, Copper Tin Platinum give much less scintillations, Copper to Copper scarcely any.

Lead & Iron, give much finer than iron to iron = and the forked ends have more prongs = & in some cases the scintillations are not seen until an inch or so away there is apparently a break in em =.

Phenomenon If a piece of metallic Silicium be placed between two metallic or Carbon poles & many pulses passed yet red hot a

Labrate
not!

Continuous Electric Light with
Snaps is obtained. ~~Ive~~ I
~~Ex~~ have the Condensers as
Connection first part
of book I have no double
but a piece of silicum would
serve to keep the Carbon
points of a common
Electric Light going
Constantly ~~&~~ Lithium
does same thing but only for or
a time until its valuable ed
which is not the case with Silicum
Baron gets very hot & keeps
hot if small gram be used
but does not act so well
as Silicum.
Of all Metals Magnesium
Ribbon gives best
Scintillations but they
don't hoot out so far as iron

Putting Paraffine on metal &
using Copper wire to slide
through it great snap &
flash of fire. 1/4 diameter looks
wicked & like an explosion of paraffin
in new vacuum of paraffine =
Salts dry =
Chloride Lime nothing explos
Camphor. acts like paraffin
probably explosion only effect of
confinement of spark —

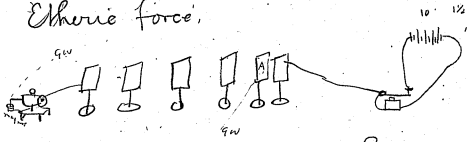
Starch Sul Copper neg
Nitrate Potash neg
Oil Sweet almond neg
Borax Pot neg
Salt pretty good —

237

Nitrate ammonia Salt
Eucalyptus to brown powder
Dyspnoea. neg.
Coca buds acts similarly
Putting in Rheostat with
200 or 400 ohm in wire lead
to Emg kills sparks.—

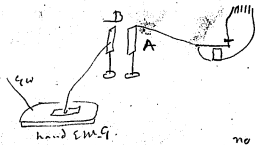
238

Etheric force.



With 6 sheets of suspend foil on glass rods
Each foil ~~having~~ being 12 X 8, and the total
distance 4 feet get spark quite often in
Etheriscope. with 10 ohm spool connected in
place of ground wire by grounding A
makes no difference in getting spark at Etheriscope.

If connected thus.



With Iodide Pot 20 gm to 100 cc. get no spots
Showing decomposition ~~[illegible]~~
~~[illegible]~~ but appears to be faint tinge
though this may be due to pressure
of platina Loop - but when platina
connected direct to A get good
spots in 2 minutes, the spark is very
with platina shows scintillation ¼
to ½ inch long. When Platina to B
sparks a bright with no scintillation
Using Connecting to B filters the E
from the true Etheric

I now propose to submit all the H_2O solution to the decomposing power of the ether. by allowing platina point connected both to A & then to B to rest on strip of paper for several minutes.

=

Sulphate Zinc = nothing

Ferrocyanide of Potassium 20 grms 100cc = = salt =

Phenomenon - after 2 minutes there accumulates a salt on the platina at the point where it rests on the paper: under the microscope - low power 1/4 - it looks like a piece of salt that runs over model of battery ~~was~~ called =

I try it again get same salt but less in amount probably because the paper is dry I now by a new strip of same = gives same salt = I now try a little wetter strip still gives it somewhat better = I now try on quite wet, salt appears almost instantly

I now put a piece of wet strip on the platina of Emq & laying the platina Etheric current at the point of contact = same salt but not so much in amount = gives twice the passage of current from 2 cells

But gets nothing on the oxide & a blue Coloration on other = Evidently the Etheric decomposition is not the same as the Electrical from 2 cells at least

Ferricyanide Potassium = Reg Auto Sal.
only a slight greenish coloration
on one side a bluish general spread
out down on the album

---

1 gram Mono-chloro-acetic acid = mix -
20 gram ditto = exceedingly faint yellow
coloration just seen with 1/4 power in
microscope

---

20 grms grape sugar 100cc = mix

---

5 grms 100cc Microcosmic Salt mix =
1 gram - Phosphate Manganese = mix
1 gram Lacto-phosphate Bismuth = stirring vigorously
300 milligrammes Bromide of Mercury mix -
1 gram Perchlorate Potash = mix,
5 grms Sulphate Uranium mix
1 gram Acetate Strychnine mix

241

10 grms Hyposulphite Barium nix

1 gram Lactate Quinine nix

1 gram Iodide Zinc = nix =

1 gram 400 mg. Lunar Caustic = nix

20 grams Iodide Ammonia nix

5 grams Valerianate Potash nix

20 grms Nitrate Uranium — slight yellow dot in 5 minutes

5 grams Uric Acid nix

I notice that first the crystals completely cover the bottle inside & within the liquid like frost on a pane of glass = in 5 gram Valerianate Potash =

Nitrate Uranium 20 grms — I notice that on strip near top of bottle where evaporation has concentrated it = paper is completely disintegrated & is like mush in the fingers =

242

5 grms Citrate Ammonia = I notice that the strip immersed and in contact with this solution but not above it is colored strongly flesh color. This is a very strange Calorimetric for this salt and = The strip has probably been immersed 3 weeks or perhaps 1 month

Mix in Ether

---

2 grms Binoxalate Potash = mix

20 grms Bisulphate Potash = 1st strip shows in 3 minutes a birds nest of a salt which rises up around sides of platinum like that in the ferrocyanide of platinum but not near so delicate a reaction = Wet new strip same but no so strong

---

20 grms Phosphate Soda = Mix

1 gram Oxalate Potash = mix

5 grms Tartrate Potash mix

243

I am now going to put in a
Quad Reversing Combination so I
can reverse the direction of the
Ethric force if such a thing is possible
by reversing the battery =

Very important experiment proving that
Ether Currents are not reversed
Because with Ferro cyanide with the
battery Current in one direction I
get the bird nest salt test strongly
whereas the other way I get
nothing to speak of though under
Microscope can just see the slight test
bird nest poly due to salt many
from plate underneath though
Jap =

---

5 grams Acetate Baryta - Quadrons Sons
up =

grams Ferrocyanide. Ammonia. up = slight
yellow red spot on yellow paper
= still sharper. yellow
quite strong

5 grammes Citrate Potash down mix
up = mix

5 grams citrate Magnesia up - mix - down
mix

3 grms Oxalate Soda - down + up mix

5 grms Acetate Baryta up + down mix

5 grms Tartrate Potash down up mix

5 grms Lactate Zinc up - mix down mix

5 grms formiate Soda down mix up mix

5 grms Sulphate Cadmium up - mix down

20 grms Potassic Hydrate = down mix

5 grm[illegible] Chloride Nickel up - mix down mix

5 grms Fe[illegible]anide of Potassium - down
[illegible] not litely stain on up =

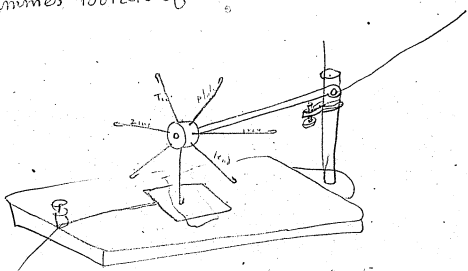
1 grm P[illegible]hate Potash up - down mix

245

5 grammes Tungstate Soda down = mix up

4 grammes Bi-chloride of Mercury = up mix down mix

8 grammes Borate of Soda down mix up mix



Machine for Etherolysis.

Gron

5 grammes Bicarbonate Potash = up mix down mix

20 grammes Sulphate Magnesia. I notice paper covered with a thick white Pumice semi-transparant, this is queer for a Sulphate - down mix - up mix. I try a fresh strip down = mix up mix

10 grms Bichromate of Potash - up slight red opax with Birds nest quite sensitive. down same Colouration perhaps more but no Birds nest - with 2 cells ~~[illegible]~~ shortest gas gas no colouration 3 minutes

5 grammes gum arabic. down + up mix

1 gramme Gallic Acid up, + down mix

5 gramme Pyrogallic Acid. down. up - nothing

20 grammes Nitrate Potash. up. + down Bird nest

salt = appear colorless under microscope

but to naked eye there are spots = appears to

be an equal deposit on up and down, not so

sensitive as Bichromate of Potash or Ferrok.

40 grammes Bromide of Potassium down + up

get bird nests one greater than other. forgot

which - I use the old strip in bottle to

determine which gives most = now up-

down work so well as fresh paper I now

by fresh paper, but it will require

special precautions to ascertain

because the strip becomes dryer

the up gives very deep birds nest dilts down

gm with 2 cells gets no reaction whatever, short circ both poles

5 grammes Bromide Cadmium, down + up mix

8 grammes Chlorate of Potash, mix

20 grammes Phosphate Ammonia, mix

10 grammes Formiate of Copper. mix

40 grammes Nitrate Ammonia mx

40 grammes Nitrate Strontia. Bird nest good on up.
not so strong on down but strip dries =

20. grammes Carbonate Soda. Small Bird's nest

20 grammes Sulphate Soda. Bird's small nest on down
only

I notice in Carb Soda 20 gm fine mica like crystal
over above regular crystals + in iodide

Iodide Palassium 20 grammes down -
good. Red mark but I dont think reaction
is so great as Bird's nest after the ferrocyanide,
~~[illegible]~~ stronger on up = it shows
clear through showing free iodine
given off at all points =

I now put it so Ether must pass from
one fool to the other 6 inches = think
I see faint mark but doubt = Ether
burns very strong

20 grammes Hyposulphate Soda, get a faint black Calcination but think it was due to dirt on platina & clean ~~strip~~ platina & put in new strip

it was dirt

1 gramme Chromic acid = mix vapor dam

20 grams Common alum mix

20 grammes Sulphate Zinc = mix

20 grms Tartrate Soda = mix

10 grms Tannic acid = mix

1 grm Arsenate Quinine - mix

5 grms Arsenite Soda mix

5 grms Vibrunate Ammonia mix

1 grm Acetate Soda mix

1 gram Sulphate Cobalt nothing

1 gramme Carbazotic Acid - nothing -

1 gramme Carbonate Lithia. no good.

14 grammes Acetate Urinum - mix

20 grammes Arsenate Soda. mix.

20 grammes Manganate Soda. mix

1 gramme Nitro Prusside Sodium - mix.

5 gram Amygdalin mix

1 gm Chloride Copper - mix

5 gm Hypophosphate [illegible] mix

1 gm 500 mg. Cyanide Silver mix

1 gm Cyanide Mercury mix

20 grammes Sulphate Iron good

gues. two faint spots in dark black granules -

8 grammes Proto-acetate Copper dom.

faint blue made in 1 minute

Note & notice in this bottle two crops of crystals 1st faint blue color deep intense green: 2nd - strongest blue green =

250

1 grm Protoacetate Copper = mix

20 grammes Iodide Iron

500 mlg Cairmne no 40. mix

20 grms Iodide Calcium good red spot on down shampa m up

the Calcium Iodide is a good ifnot Gell then Iodide K.

1 grm Sulphate Carium mix

20 grms Sulpho Carbonate Soda = fine spot m up + down

5 grammes Manganate Potash, mix

5 grammes Acetate Iron

5 grammes Acetate Potash mix.

1 grammes Sulphate aniline mix

20 grammes Sodic Hydrate Pleburia auto down m p m apparently a Coloration, =

20 grammes Hydrobromate of Ammonia = Buds nest Crystals

251

20 grammes Chloride Lithia mix

5 grammes Stannate Soda. Yellow spat

20 grammes Sulphurettede Sodium mix

1 Gramme Sulphuret Barium mix

6 grammes Acetate Medical-Chemical Co

20 grammes Sulpho Cyanide Potassium. mix

5 grammes Caustic Baryta. mix

20 grammes Chloride Alumina. Chemical

1 grame Iodine = mix

30 grammes Hypophosphate Ammonia mix

10 grms Bisulphite Soda. mix

20 grammes Chloride Cadmium

20 grams Cyanide Potassium = Yellow spat

20 grams Protochloride Tin Yellow spat

20 grms Acetate Lead - mix

20 grammes Sulphite Ammonia, Chemical

5 grams Acetate Uranium & Potash. Mix

1 gram Chloride Lead.

20 grams Chloride Barium Bird nest

252

5 grammes Pyro-phosphate Soda,

5 grams Phosphate Manganese.

20 grms Tartrate Iron Red Spot up & down best yet More sensitive than Iodide Potassium = fades

5 grms Salicine mix

20 grams Benzoate Soda. ~~mix~~

Beautiful Brilliant crystalization deep and polished inside with a white rim = =

20 grms Chloride Stronti mix

1 gram Phosphate Calcium mix

5 grams Nitrate Zinc mix

20 grms Acetate Strontia mix

5 grms Fluoride Soda - Pale yellow spot family sensitive. Can the fluorine which has never been isolated -

Common Salt

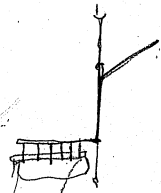
Phenomenon

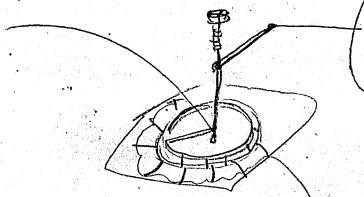
There is a very deep birds nest formed and this nest is on top of a platform of crystals which appear just like an Queen Elizabeth ruffled collar to cover the top of the nest & perfectly round and raised up from the paper to very sensitive reaction, with Ether disconnected nothing = I feared it might be a crystalization from the Cal ~~micro~~ metal = This salt reaction is what makes the Tornado made of Potassium & Salt Solution work though the reaction is different. I will test this soon If paper ~~[illegible]~~ not very wet dont get the Elizabeth ruffle - I now dry a drop = of sol.

Conductor not any reaction with
drop =

Chloride ammonium Bird
nest crystallizes peculiar
w. this =

255





Specimen Test

16
1 8
4
2
1

Fig 14.

1897

256

E-1686
vol. 8, sheets
258-363; Aug.2-
Aug. 18, 1876.

Sheets $\frac{258}{8}$ to $\frac{363}{8}$

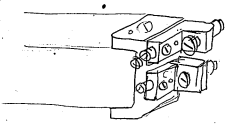
Sketches

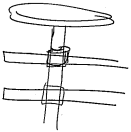
760802

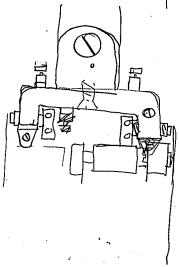
Aug 2, 1876 — Aug 18, 1876

Experimental Researches

Acoustic Transfer
Aug 2 1876
T A Edison







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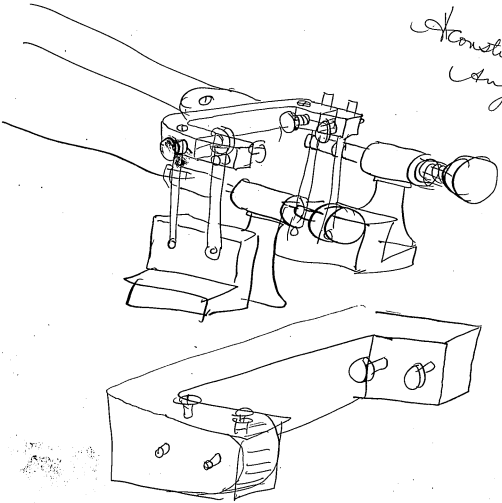
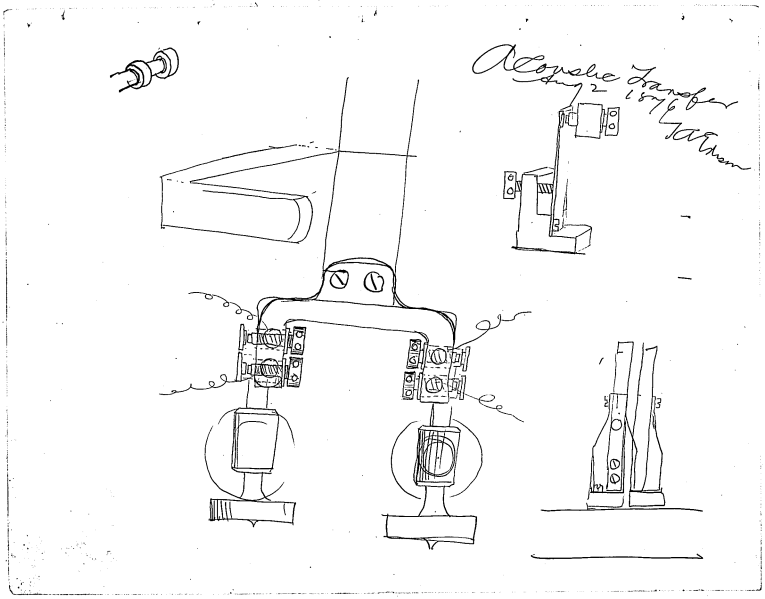


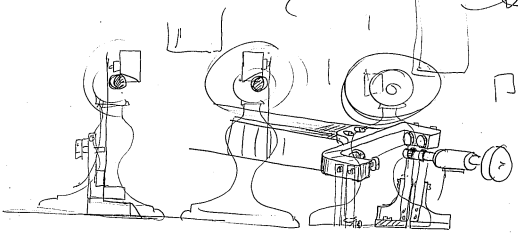
Acoustic Transducer
Aug 2 1976
Tillson

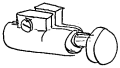
258


Acoustic Transfer
Aug 2 1976
Tatham

Acoustic Transfer Stage

Aug 2 1896





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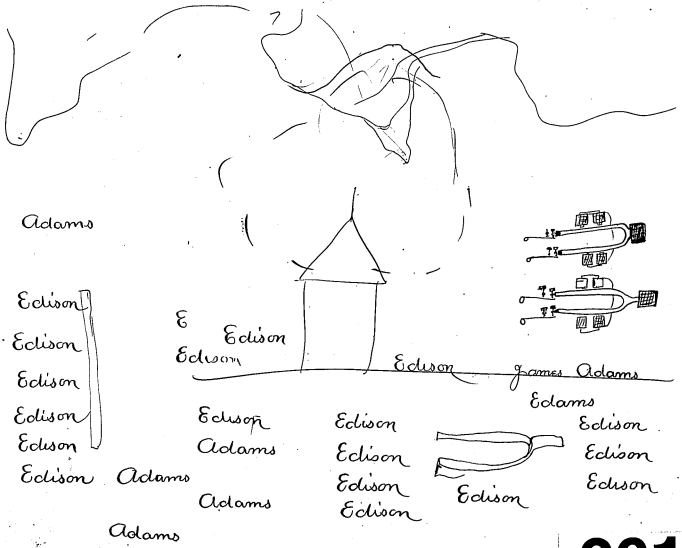
Adams
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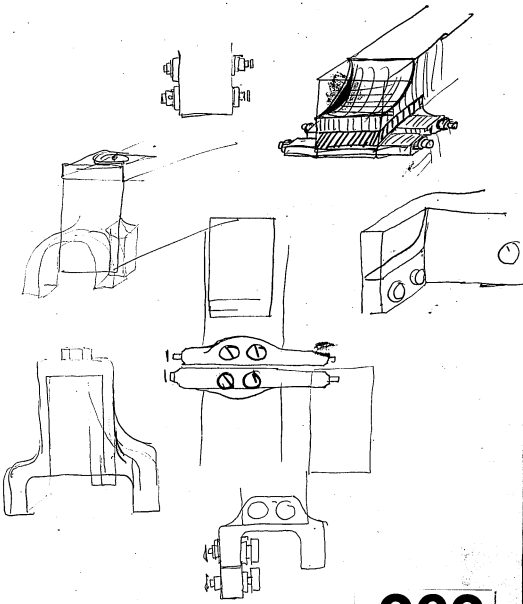

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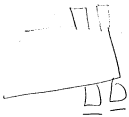
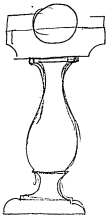
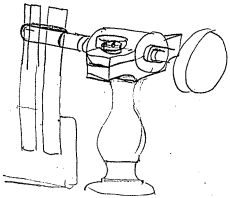
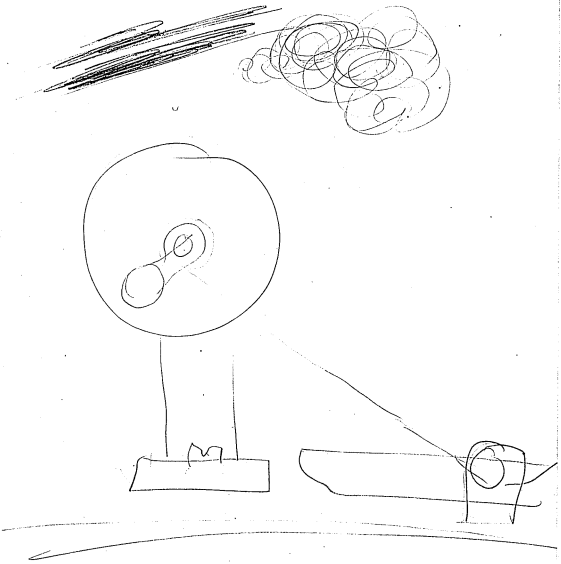
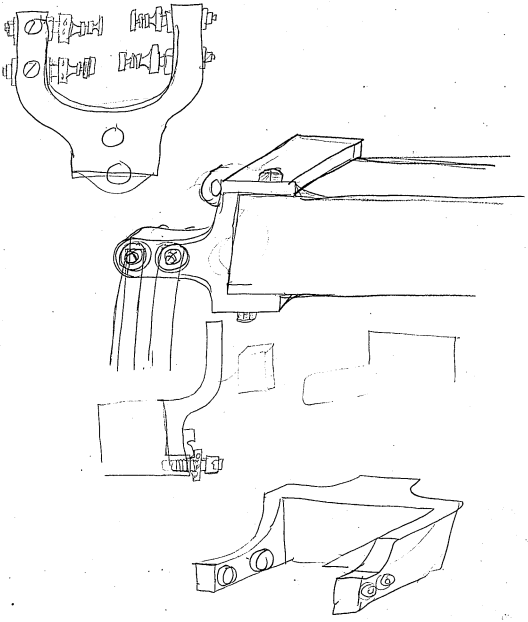






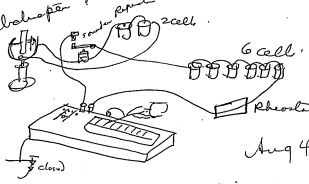


264



265

Electromelanograph Experiment



Aug 4 1876 J C Edwards

Standard 3000 ohms pyrogallic paper same as made for Domestic, phelms pen =
Hydrogen — vibration just ~~see~~ felt

O.T.H. – Bi Sulphide Carbon Acetic Acid – nothing on 3000,
N. Alcohol + Caustic Soda, will work equal to
pyrogallic through 30000. ohms the paper owing
to evaporation of alcohol is quite dry
in few minutes gets perfectly dry. it
works quite strongly through 70,000. ohms
all we had – by opening + closing the key
+ stopping + starting the vibration
the effect ~~is increased~~ deflection is
greatly convenienced as the hand can readily
detect the stopping + starting of the
vibration = ~~Very plain through 70~~

266

We now take Cornutina ~~Potash~~ Soda + Alcohol as a standard, vibrations when key is worked being clearly felt through 70 000 ohm

O+H Alcohol + Oxalic-A. nothing felt at 70000,

Silver + Cop on Ag - Alcohol + Tartaric acid vibration just perceptible not so good as standard

O+H. ~~Pot~~ Oil Sweet Almond + Iodine nothing surely felt

O+H Oil Turpentine + Creosote - nothing felt

O+H. Oil Rosemary Cone' - nothing surely felt --

O+H. Spirits Turpentine + Glacial Acetic acid nothing felt yet when key open apparently feel some vibs it may be that the sol is of extreme delay & requires perfect and invariable to stop vibs =

267

O+H Bisulphide Carbon Glycerol Acetic A.
nothing felt since =

Bi Sulph Carbon - Creosote nothing dries
almost instantly =

Spirits Turpentine + Iodine nothing
felt =

Bi Sulph Carbon - Spirits Turp = nothing

Spirits Turpentine Hypposulphite Soda Nothing

Spirit Turpentine - Carbolic acid - Nothing

By pulling away from hand EMG so = Cured at
all. Vibration apparent
feel Mechanical vibs - could tell better,

Alcohol & Tincture Chl Zinc. just feel
on H =

820 P.M. Cor start again =

268

Bisulphide Carb - Turpentine - Glacial Acetic A
on H. quite plain on Nickel + more plain on platina
apparently nothing on O.

Turpentine + Ether - apparently nothing =
Alcohol & Iodide Potassium fair on Aluminum
on H - apparently increase on O on Tri but
feature is very faint =

Alcohol + Acetic Acid very good
probably near standard on H - best
when on Silver or Cop = nothing on O.

Alcohol + Molybdaenic acid - on O
strong increase friction when on platina
only - on H. strong test on Silver + Copper =
+ head - better best about same as
standard = Dries too quickly =

Alcohol + Bromide of Potassium Nothing
" Fused Zinc Chloride "
Acetic Acid Fe deluth "
Ammonia Hydrate + H_2O. "

269

Bromine + Oil Rosemary		nothing
Turpentine	Fuming Nitric a	"
"	Bi Sulph Carbon + Iodoform	"
"	Chloroform	"
Rosemary	Caustic Potash	"
Turpentine	Wood Naphtha	"
Glacial Acetic	Acid	"
Cocoanut "	"	"
Oil of Sweet Almonds + Rosemary		"
Rosemary + Iodine		"
Turpentine	Creosote	Fuming Nitric a — nothing
Bi Sulphide Carbon, Cyanide K + Iodine		"
Spirits Turpentine	" Potassium	"
Ammonia	Strong	"

Caustic Strontia + Alcohol
first class nearly as good as
Standard delicacy decreases
rapidly on Evaporation of Alcohol
Nitrate Zinc + Alcohol = GOOD. = nearly up to Standard
best on Aluminum + Nickel — nothing on O.

Alcohol + Hypophosphite of Ammonia,
great increase fraction on O. on Silver + Copper
N. not so good as standard, better when
strip is little dry — when wet fraction not
noticeable,

270

Best yet

Alcohol Bisulphide Carbon + Caustic Pot
better than Standard =
paper want to be little dry
+ hard pressure on point

Alcohol + Castor Oil.
Not good as Standard as
an increase friction greatly on
O. not good on H.

Alcohol only about as
good as first standard (12)
Can. Soda + Al.

Alcohol + pyrogalate ~~as good as~~ better than
1st Standard

Alcohol + Sulphovinate Soda -
Not good not better than
2nd Standard (12) Al Bi Sul + Can K.
quite fearful increase on O. even stronger
Change the dec on H

271

Oil Lavender + Glacial Acetic Acid Nothing
Alcohol Glacial Phosphoric Acid "
Oil Sweet Alumnos + Desquichl Fe "
Water + Salt — Nothing =

// Best yet 3rd Standard

Alcohol + Nitrate of Uranium = ✕
Make further tests

Alcohol + Iruen analine = very faint =
Alcohol + prato Fe — perhaps smtg on H
Turpentine HCl — Nothing
~~Fe~~ Bisulp Carbon HCl + Iodine "
Alcohol Castor Oil Caustic K Nothing
Alcohol ~~Chl~~ Chloral Hydrat. Fair about
Same as No 1 Standard =
Alcohol Carb Ammon about as good
✱ as 3rd Standard

272

Alcohol & Methylene Blue about as good as 2nd Standard in A
get weak when paper dries =

Benzine & Iodine = mix

Alcohol & Aniline Brown mix

Benzine & Oil Turpentine = mix

Alcohol Salicylic Acid
Concentrated Solution mix

Alcohol Camphor & Glacial Acetic Acid mix

Alcohol & Salicylic Acid — mix

Alcohol & Starch about like
" 2nd Standard and like Alcohol itself

Alcohol & Grape Sugar
" Same as above.

Oil Mirbane, Alcohol & Nat Cryst.
" good if not better
than 3rd Standard

very good ppt. drying out well =

Alcohol & Red Aniline
Increase in O on Tri fair deb

273

Oil Mirbane + Oil Sweet Almonds Mix

Alcohol + Iodine "

Bi Sulph Carb + Turpentine. Oil Mirbane + Benzin Mix

Benzine + Glacial Acetic Acid - mix

Alcohol + Blue Aniline mix

Alcohol + Bichromate Chromium not mixed good -

Glacial Acetic Ether Nearly 1/first

Equal 3rd Standard fuchsine

Expert

Alcohol + Acetate Mercury -

Equals = 2nd Standard =

Bisulphide Carbon Bichromate not mixed good

" Oil Mirbane "

Oil Mirbane + Glacial Acetic Acid

just dissolved it

Oil Mirbane Bichromate Mix

274

Alcohol & Bi Chromate of ammonia
Increase fraction greatly on O,
~~do~~ Effect disappears when ppt nearly dry
Alcohol & Tannic Ac — Mix
Bi Sulph Carbon Olive Oil & Iodine — Mix
" Cod liver Oil — Mix
Olive Oil alcohol Bi Sulph Carbon & Hydrophobia
Almost as good as 3rd
Standard

~~Turps~~ Oil Rosemary Carbon Bi S. — Mix
Bi Sulph Carbon & Castor Oil — Mix
Carbon Bi Sulph & Sat Sol Chl Fe — No good
Oil Rosemary & Sesquichl Fe.
Oil Mirbane & Iodine.
Alcohol & Cochineal,
Spirits Turp Bi Sul C & Iodine,

275

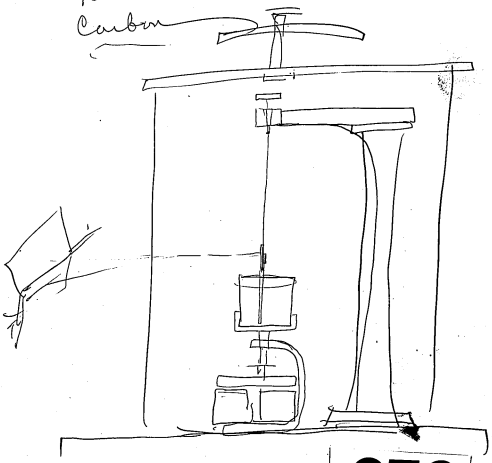
Alcohol & Sesqui Chl Iron mix

Alcohol & Nitrate of Lime nearly as good as 3rd Standard =

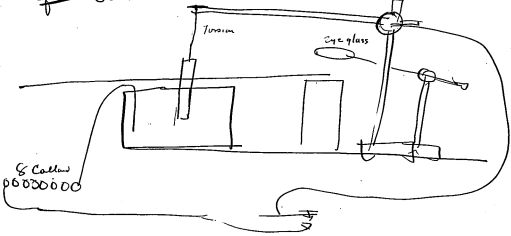
Alcohol & Monochloroacetic acid, mix,

All the preceding through 70 000 ohms with 6 cells

Carbon



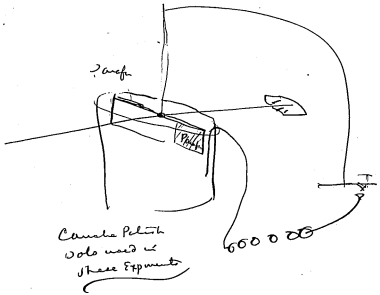
Tried suspending a piece of lead in a cup kept rotating by Clockwork, But as the clockwork wouldn't rotate only for a few seconds & my dimes were very crude did not get right result ~~for~~ But one little unsuspected



on closing the cylinder of lead rotated ~~to each second~~ & thereafter made an oscillation of about 1/32 inch slowly to right on closing & did it several times.

Tried a flat paddle

Suspended by loosen wire

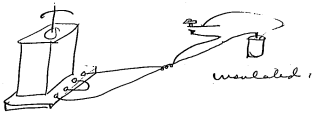


The opposite sides of these ends were paraffined, in closing points showed considerable deflection,

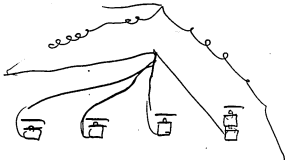
Aug 6th 1876.

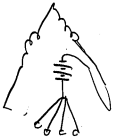
Tonight ~~tried~~ on our Mirror Gal found that it was hard to keep it at zero, = with I Daniell or other Collard found that it was extremely delicate unexpectedly so. if there are no

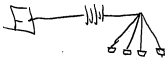
Sources of error



got deflection of 12 degrees with wire twisted as shown. Then brought up the Elliot Thomson & had lot of trouble to get it to zero & at last broke the fibre in the endeavor hence couldnt compare =
I think the Elliot Mirror is too clumsy =







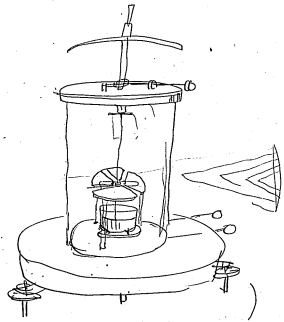
Keep carefully

Experimental Notes

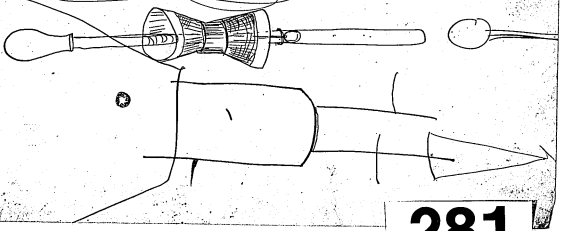
Last page E. M. Gray

to relays & telephone

In my Quadrant Electrometer the glass of the Leyden jar was white shellac'd appon had - the jar does not hold the Charge hence I propose to make a hard rubber Leyden jar -



Hand Electrophorus



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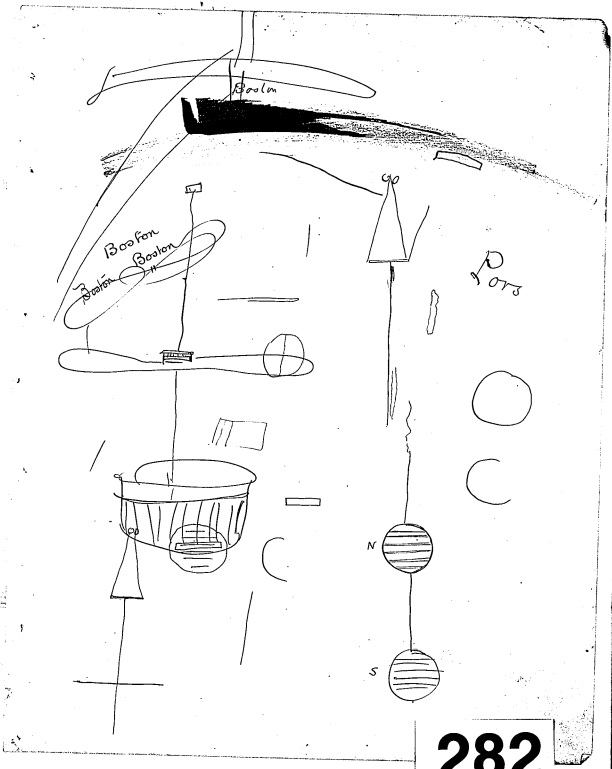

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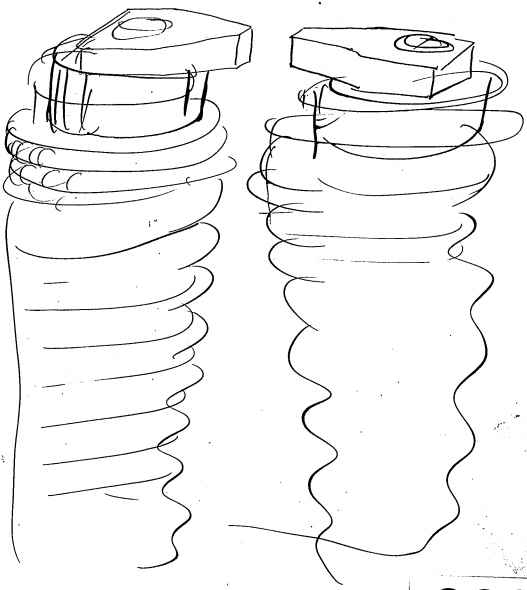

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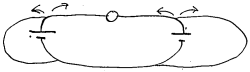

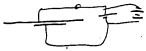

I have an idea that each particular combination of element & exciting fluid in a galvanic battery give out electricity with diffrent rate of vibration in the same manner as the vapors of metal in a flame are proved by the prism to have diffrent rate of vibration hence I have announced the idea that with a cell filled with certain chemical solution & platina electrodes that 100 units of current from one source will pass through that solution in greater quantity that 100 units from a diffrent source; in the same manner that the heat from Hydrogen will pass through

a Solution of iodine in Carbon Bisulph than from a Candle or even from another source of light & heat of greater intensity. If the rate of vibration of the Electricity be the same as the vibrating Molecular time of the liquid through which it passes very little Current will pass but if different it will pass readily. Hence I conceive that the Static Current passing out of a Submarine Cable has a different rate of vibration than that due to the primary battery Current hence I propose to filter the primary ~~[illegible]~~ from the Static or Secondary Current by a liquid whose time of vibration is the same or an multiple thereof of the static Charge. Should I be unsuccessful in obtaining the I can simply

another liquid and two
signalling batts of which
produce the same change in
the Cable but whose absolute
time is different and I want
a certain liquid that will
allow the current from one
batty to pass through readily
Easily while the other does
not pass so readily - hence the
Cable will be constantly charged
& Rapid signalling will be
obtained = I try a preliminary
Experiment this Evening

July 30 1876 -

T. A. Edison

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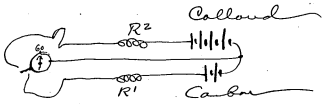
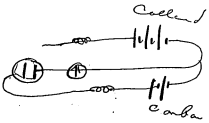
Aug 2 1876



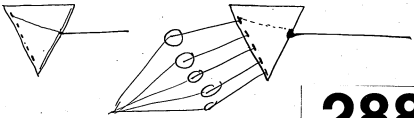
R1 & R2 are made so that the deflection from either battery will be the same = Then



60,

45.

- Alcohol
Bisulphide,
Solution in Carbon Bi Sulphide,



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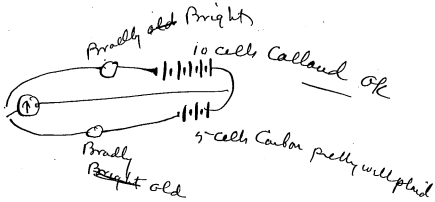
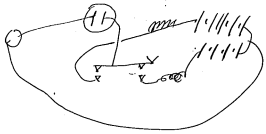
Experiment on the different vibrating times of Electricity produced ~~by~~ from different Sources

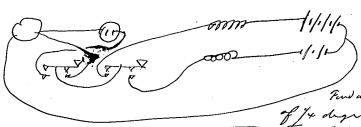


again [redacted] Calland 5 9 Carbon 58½

Put on Key thus



Have now arranged it thus —



Find a difference only of ½ degree as not have thus balanced before

No 1 Coil 65 10 Collaud 1020 R
" 1 " 65 5 Carbon 1000 "
with Copper El - Ho = 59 on Collaud —
again 59
" 59
Carbon 58 1/2
again " 58 1/2

Aug 7/1876

Re heated direct both touch 65

— " —

I add now 2000 ohms in each resistance coil - when it is perfectly balanced there appears to be a difference of 1/4 of degree between them Even when the balance is against the one giving the lower deflection = I now decrease the resistance to as low as possible so that resistance of Electrolyte will move noticeable - Balanced about 600 in each - 75 - same difference 1/4 degree - I try no 2 coil now makes about 1/10 of a degree lower on Carbon yet on balancing Carbon is little the strongest - I now add about 5 tablespoonfuls of alcohol to the water of Electrolytic cell no 1 Coil 1/2 degree less on Carbon needle responds sharper & more readily

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I now empty 1/2 the alcohol & water out & add to the remainder 2 bottles powerful of chloroform & balance 3 times at 75 exact there is a difference well defined of 3/4 of a degree carbon deflecting it lower - verified this six times - used lense to magnify the scale of galvanometer - seeing one of the leading wires from the Calland nearer the galvanometer than that from the carbon fixed it and made the test again found that it was not a source of error - doubled the amount of chloroform found that perhaps give a little more deflection down the scale - I then threw the carbon out of balance increasing its strength by plugging up 20 ohms this gave 75 1/2 while ~~carbon~~ Calland gave 75 on throwing them through the cell carbon gave the lowest deflection I now add 50 more making 70 in favor carbon by the balance I find that carbon goes to 76 1/2 while Calland remains at 75 - when Calland is put to cell gives 58 carbon 58 1/4 scant with 60 only plugged up on carbon it gave 76 1/4 scant Calland 75

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with 52 ohms in carbon making it just so much stronger than Calland & giving 76 while Calland gave 75 - putting either through the decomposition cell gave precisely the same deflection. - Nitro-phenic acid in water being possible conductor need only 1/2 inch in 4 oz battery balanced both batteries @ 75 found electrodes polarized rapidly 64 on Calland. 63 1/2 on carbon added little alcohol that makes electrodes polarized rapidly to 58 1/2 carbon 57 1/2 in one minute - Calland 57 1/2 carbon 56 - polarized in one minute to 55 - 53 1/2 in carbon - water & glycerin 1/2 5 1/2 making about 1 1/4 in 4 oz battle - Calland deflection 42 1/2 carbon 40 3/4 with pure glycerine not enough deflection to get a test owing to non sensitiveness of the galvanometer - added a little water ~~when~~ and I got about the same results as in the first instance - Bromine water & water 1 inch in 4 oz battle balanced 75 Calland 63 1/2 - 62 3/4 carbon - again Calland 63 3/4 carbon 63 added a little alcohol, 3/4 of a degree difference - water and sulphuric ether 1/2 inch in battle balanced in favor of Calland it being strongest by a 1/10 of a degree

Calcand through decomposition cell 33 1/2
Carbon 31 3/4 again Calcand 33 carbon
31 1/3 addition of a little bromine water
to above, resistance gradually decreases
diffrence 1/4 degree = added little alcohol
still 1/8 diffrence balance moder 1/8 degree
higher on carbon Calcand 61 Carbon 60 - Benzol &
little water deflection down in the 10s 1/2 degree
lower on carbon than Calcand more Benzol 1/4 deg
diffrence about 1 deg dif =
added Bromine water 71 1/2 Calcand 71 1/4 Carbon
balanced very slightly in favor of Carbon
poured off the Benzol & used it with electrodes
Calcand polarized so rapidly cant test it - its very
little. say 1/2 degree. it goes down scale to
70 - chloride potassium poured in Benzol
so as to form a layer at bottom bitt needle
to 73 - by giving little more strength to carbon
1/8 degree the carbon is weakest through
cell by 1/4 deg - water & caustic potash needle
goes to 72 - diffrence between cal & carb 1/4
degree - bal 1/8 deg favor Carbon yet Carbon
1/4 deg weakest through electrolytes =

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alcohol solution of potassic Hydrate perhaps
some water got in as deflection is 73. only 1/80 deg
difference in Cal. & Carbon deflections
added to this mercuric nitrate when bal in
favor 1/2 deg of Carbon - could not perceive any
difference between Cal & Carb
Solution of mercuric nitrate balance in favor of
Carbon 1/8 deg Carbon gives 1/8 degree greater
deflection than Calland shewing that mercuric
nitrate conducts equal well with both carbons
for fear that something has altered my
Electrodes I try water again 1 1/2 deg between
Carbon and Calland - same after 3 minutes of
electrification =
Prot. Chloride Saturated Solution offers scarcely
any resistance but by using very small galvanometer
there was a deflection of 1/2 degree Carbon
being that much less conducted. Bal favor
Carbon with plenty Water & Rosemary
Carbon appears to be 1/8 higher than
Calland or slightly more than the bal. in
di water
Rosemary only (perhaps little water got in)
deflected Calland 65. Carbon 64 1/4
addition of small lump Prot. Chloride of Iron
Calland 66 Carbon 65 1/4 -
Addition of same Common acetic acid

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scarcely any deflection
Either only - 1 Deg. Difference - with Salt 1½
(Balance favoring Carb) When shaken there
is a def ~~[illegible]~~ of 2 Degrees When in the 50's
& 1¼ When in the 60's - addition Acid sends
needle to 76. then ¼ Deg. lower in Carbon
Pure Spts Turpentine - No current, Ground
Hot Copper Electrodes get wet in between
them by the block of hard rubber took
this out so they were entirely seperate -
Glacial Acetic Acid added deflection Only
15 = Carbon Shows ¼ - Deg. less of ¼ = deg.
in favor Carbon & Metal Circuit - added
few drops nitric acid deflection goes to
- Called 48 = Carbon 46 - Stood it well
dif ¾ Deg. Deflection goes up to 63.
adding more nitric acid makes deflection
greater & difference less -
Tartaric acid ¼ in in Bottle - Cleaned
Electrodes (I perceive a little mercury
when clean) 1½ Deg difference Standing at
70. After standing for some time & allowing
the Electrodes to just touch polarizing down
in the 50's then there is 1½ Deg. difference
I find that by screwing the Key close
& making just Contact that the needle falls
1½ Degrees & stops there & on closing
on Carbon it dont go any lower
While if I stop on Called it ~~dont go~~
~~any higher~~ goes 1½ Deg Higher
Carbon the metal resistance
slightly stronger —

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Bromide of Zinc Saturated very little
Water - & auf - in it - gives deflection 7½ -
Carbon ¼ less than Gallend -
With the very edge of the Electrode touching
goes down in the Hole & there is a difference
of 2 Degrees
Pyro - Oxylic Spirit & little Aniline Oil
Sp. Gr. 1¼ Degrees Clearly defined ¼ in
favor of Carbon On metal resistance
addition ammonia - Hydrate Bring Needle
to 70 & makes diff of only ¼ Deg.

Phenomenon

Oil of vitriol Almonds & Saturated solution
Pots Chloride of Iron well Shaken On closing
On Carbon jumps back ½ Deg. then on
Gallend goes up Sharply 3 Degrees then
On closing on Carbon goes back ½ Deg.
then on closing goes up 3 Deg. still
higher & same way till it creeps up to
65. - from 35. it also acts very funny
in other ways - at 65 makes 1 Deg Diff.
Well Shaken goes to 10.
It appears to go very easy -
By adding more Chloride it goes
to ½. When diff is only ¼ Deg.
I shall now endeavor to make
some Lead Electrodes - Also some
Lead & Tin. Electrodes

Aug 15 1876.
Tal

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We find upon further experimenting that a resistance Coil can be substituted for the Decomposition Cell which gives the same result. but apparently not in as marked a degree as some of the solutions - For Instance -

We find that by the insertion of a Certain resistance - say 500 ohms - of a Rheostat in place of the Decomp. Cell - & by the Manipulation of the Rheostats in the Leading wires from the Battery - a perfect balance Can be obtained on Galvanometer. showing that Currents of the same intensity passes ~~to~~ the Gal. from the Battery. the balance is destroyed when the total Res. is increased or decreased from the point At which a balance was obtained - this is probably due to the difference of the ~~two elements used~~ propelle force of the - For Instance. If upon a 500 ohm Res. including a Gal. upon the insertion of a Carbon Batty a Certain deflection (say 60) is obtained by withdrawing this & substituting a Copper Battery giving the same degree of deflection an opposed Equal current is obtained - but if the Res. of the Ckt. is materially increased it will be found that one or the other Batty (one give several degrees more deflection than the other - In our experiments tried to balance the Carbon & Copper Cells as near as possible by means of the Rheostats in the Leading wires from each Battery but found that a perfect

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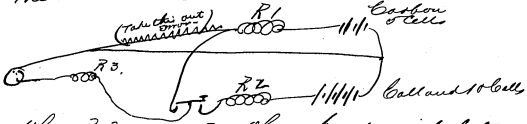
balance could not be obtained - which would hold good for all variations in the Rheostat inserted in place of the Decom. Cell -



When R. 3. was 500 Ohms. by manipulation of R1. + R. 2. a perfect balance could be obtained on Galvanometer when either Battery was placed in circuit (by means of the Key) An increase or decrease in R. 3. destroyed the balance

By inserting the strength of the Copper Cells + shunting them with R1. a perfect bal. of the Batteries was attained - which could not be disturbed by any variation in R3. This balance in 5. mins. however - was disturbed by local action in the Battery re balanced again + in 3 minutes found it out 1 Degree - a 3rd balance at the expiration of 10 mins. left the balance perfect at zero -

By inserting a resistance in the leading wire to Gal. + another in the Decomp. Cell wire + taking the deflection of through the Metal Resistance

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& of the Decomp. Cell Res. at the same degree of Deflection we are enabled to notice any difference between the Metallic resistance & the liquid resistance, starting with balance in favor of the Metallic.

Using Zinc Electrode

We obtained with the solution named below - the variations of deflection as follows:

Water			Slight Difference	
Alcohol & Nitrate of Lead			No Diff	
Do Tequi Chlorid Iron Crystals			"	"
Do Red aniline			"	"
Do Do line			"	"
Do acetate of mercury			"	" High Resistance
Do Tequi Chlorid of Cromium	No Diff		Heigh Resistance	
Do Blue aniline Potassium	Slight "		"	"
Do Brown Do	No "		"	"
Do Grape Sugar	"	"	Very "	"
Do Starch	"	"	"	"
Do Salicylic acid	"	"	"	"
Do " " " Carbolic Acid	"	"	Low Res.	
Do Sulphate Nitrate Sodium	"	"	"	"
Do Mono. Chloro. Acetic acid	"	"	"	"
Do Castor Oil	"	"	High	"
Do Molybdenic acid	"	"	Low	"
Do Iodide of Potassium	"	"	Very "	"
Do Bromide of Cadmium	"	"	"	"
Do Acetate of Nickel	"	"	Following High	"
Do Tartaric acid	"	"	Very	"
Do Caustic Soda	"	"	" Low	"

Alcohol. Fused Chloride Zinc	20 Dif	Very Low.	Red.
Do Gallic acid	" "	High	"
Bi. Sulph. Carbon. Crystl. Cl.	" "	Insulator	
Alcohol. Chlo. Cl. Bi. Sulph.	" "	Very High	"
Carbon. Pyrogallic acid			
Bi. Sulph. Carb. Chlo. Cl. Phosphor. Hydrate	" "	Extra	"
Alcohol. Cy. of Potassium	" "	Low	"
Do Sul. Chromite ammonium	" "	"	"
Do Nitrate of Uranium	" "	"	"
Do Green aniline	" "	"	"
Do Poto. Chloride of Lime	" "	Very "	"
Do Carbonate of ammonia	" "	"	"
Do Nitrate of Strontia	" "	High	"
Do Chloral Hydrate	" "	"	"
Do Pyro Gallic acid	" "	Very "	"
Do. Gallic Phos. acid. Potassic Phosph	"	Low	"
Do Cuprous Iodide	" "	High	"
Do Nitrate of Zinc	" "	Low	"
Do Hydro. Phosphate of Ammonia	" "	"	"
Water. Salt. Solute	" "		
Oil Sweet almonds. modiflu	" "	Insulator	
Water Acetic acid Solute	" "	Low	Red.
Common Acetic Acid - Modiflu		Very "	"
Oil Sweet Almonds. Liquid. Chloride Zinc	" "	Dark Extra	"
Water, Liquid Chlo. Iron Solute	" "	"	"
Oil Rosemary Concentrated Sol.	" "	Insulator	
Glacial acetic acid	" "	Very High	Red.
Phenomenon { Decreases red. of the Current		by Increased Pressure	
Oil Sweet almonds Bromine	" "	Insulator	
Oil Rosemary Bromine	" "	Do	
Oil Rosemary Iodine	" "	Do	
Oil Sweet Almonds Iodine	" "	Do	

300

Spts. Turpentine Iodine. No Diff. Insulator
Oil Rosemary Crude Potash. " " Nearly an "
Phenomenon { needle goes 5 Degrees, then to 2, then up 1, making sudden fluctuation
Defeat for special Experiment

Ammonia Hydrate Strong No Diff. Very Low. Res.
Water Ammonia Hydrate Dilute " " Moderate " "
Oxygen Gas acid. Turpentine " " Very High "
Phenomenon { Shaking makes it an Insulator

Spts Turpentine Cy. Potass. " " Insulator
" " Chloroform " "
" " Iodide of Potassium " "
" " Creosote " "
" " Carbolic acid - " " Very High Res.
" " Sulph. Ether " " Insulator
" " Fuming Nitric acid " "
Phenomenon { 1st Immersion shows zero - then suddenly to 25 - to N. to 30 to 20 then to 25 - Sudden & Violent fluctuations of 15 Degrees at over - Standing quiet near 20 Deg. Shaking relapses (No Diff)

Spts. Turpentine. Bi Sulph. Calcium No Diff. Insulator
" " Glacial acetic acid. " " Dry
Slight Conducting When Shaken
" " Hyp. Sulph. Soda. " " Very Slight Current
" " Bi Sulph. Carbon " "
+ Glacial acetic acid - } Insulator
Slight Current Decreases on "Shaking"
Spts Turpentine. Bi Sulph. Carbon } Dry
+ Iodide of Potassium "
Spts Turpentine Creosote + } " " Dry
Fuming nitric acid
Bi Sulph. Carbon Cy. of Potassium } Dry
+ Iodine " "

301

Bi. Sulph. Carbon. & Benzole No Def. Insulator
Spts Turpentine Hydro. Chloric acid
Pneumonia { Hydro Chloric acid collect at Battery - Electrodes often touching & an Ammeter } " " No Res.
Bi. Sulph. Carbon. Iodine } " " Very High "
Alt Hydrochloric acid.
Bi. Sulph. Carb. Glacial acetic acid " " "
Spts Turpentine. Bi. Sulph. Carb. Iodine " " Insulator
Oil Methane Iodine. " " Low Res.
Bi. Sulph. Carbon. Caustic Potash " " Insulator
Bi. Sulph. Carbon. Saturated Sol. Sesqui Chloride Iron.
Pneumonia { Sesqui Chl. Iron Drops & Battery - Electrodes often touching Carbon rods - Close current on very high Res. Low Res. when Stoppered } No Def.
Bi. Sulph. Carbon. Oil Rosemary No Def. Insulator
Oil Methane Sesqui Chloride Iron Crystals No Def. Low Res.
Bi. Sulph. Carbon. Sesqui Chlor. Iron. No Def. Insulator
Bi. Sulph. " Oil Methane " " "
Oil Methane - Glacial acetic acid - " " Very High Res.
Oil Methane Spts Turpentine " " Insulator
Oil Rosemary Sesqui. Chloride Iron Crystals " " "
Benzine Glacial acetic acid. " " Very High Res.
Oil Sweet almonds. Oil Methane " " Insulator
Glacial acetic acid. Ether " " "
Benzine Iodine " " "
Bi. Sulph. Carb. Benzine. Oil Methane " " "
Alcohol Oil Methane Chloride Iodine Crystals = Vapor when chicken " " Low Res.
Alcohol Bi Sulph. Carb. Caustic Potash " " Very " "
" Camphor Glacial acetic acid " " High "
Oil Lavender Glacial acetic acid " " Insulator
Alcohol. Benzine & Caustic Potash " " Very Low "
End of Spirit tests

302

Lead. & Tin. Electrodes — Aug 6=76

Water - Gradually Dec. in Res. No. Dif. - Low Res.
Water. Caustic Potash. " " " "
Oil Turpentine Hydro Chloric acid " "
" When shaken Res. largely increased -
Sudden closing of Cct. Cotton flower on
falling of Hy. Chl. acid to bottom. " "
Bi. Sulph. Carbon Creosote — " " Insulator
Bi Sulph Carbon Iodine Hydro
Chloric acid - Very Variable & Wavy " "
Bi Sulph Carbon Glacial acetic acid
Lead attacked violently by Glac. Ac. acid. " "
Oil Turpentine Creosote & Fuming nit. acids. " Insulator
Went up slowly to 2 degrees - Lead attacked
Oil Turpentine Bi Sulph Carbon -
Iodide of Potassium — " " Insulator
Bi Sulph. Carbon. Cyanide of Potassium
and Iodine " " do
Oil Turpentine - Iodine - think I see a dif.
Oil Sweet almonds & Iodine No Dif. Insulator
Oil Rosemary Creosote " " "
Water Liq. Chloride Iron Dilut " " Low Res.
Oil Turpentine, Hydro. Sulph. Iod. " " Very High "
" " Glac. acetic acid " " Insulator
Oil Turpentine Fuming nitric acid. " " Insulator
" " Bi Sulph. Carbon " " Mod. Hi. Res.
" " Sulph - Ether " " Insulator
" " Carbonic acid. " " "
Alcohol Oxalic acid " " Mod. Res.
" Fused Chloride Zinc " " Very Low Res.
" Caustic Soda " " " " "
" Tartaric acid " " — " "
Oil Turpentine Creosote " "

303

It is evident that the phenomena so far recorded is nothing more than a destruction of balance & Electromotive force of Battery. Nothing apparently in it =

Aug 7 1896 —

Electromatograph

We have just got our new paper writer functioned & works totally well.

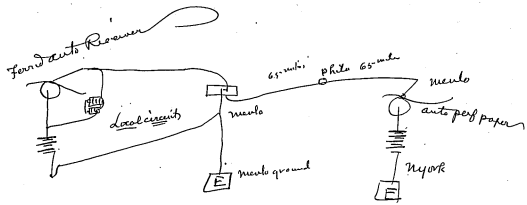
Have wet some pyrogallic paper Ferrideyanide of Potassium dilute & some of the Electromatograph paper of Metals of Mercury & Corrosive Potash =

We are going to attempt repeating through the Phila Loop. Connecting in the manner shown in the diagram

over

Wilhelm Aug 7 1896

304

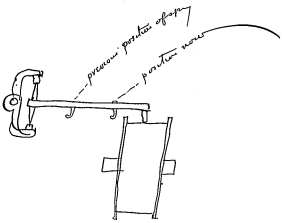


Perhaps we shall have to shunt the EMG with a magnet, also to use a plain resistance shunt at Transmitting end. Even perhaps we will a magnet in the said shunt =

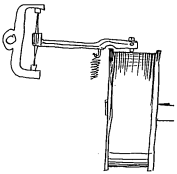
We have made a slight alteration in the method of putting on the springs on the lever of the EMG. In all previous Experiments we have put springs near to fulcrum thereby increasing the friction in its pivots, we have now put the springs ~~weak~~ nearer the Extremity of the lever reducing the friction on pivots & making a much better adjustment =

Wednesday Aug 7 1876

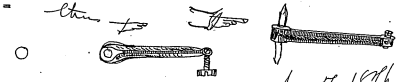
305



I think ~~that the~~ lever should be arranged thus

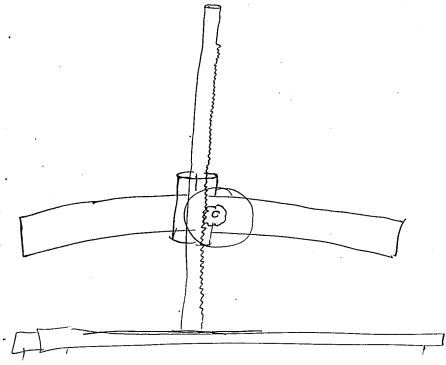


The point wants to be near edge of lever so there shall be no twist = The lever should also be made with ribs =



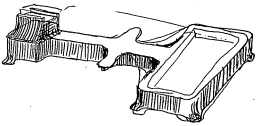
Aug 1 1876
Zoldow

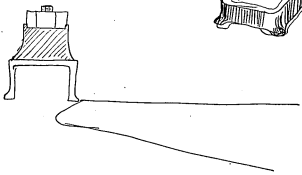
306

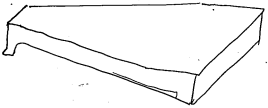


Rack Motion for Mirror Galvanometer.
to raise deviating Magnet up & down
Easily

Aug 7 1878
J Atkinson





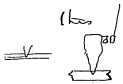


308

Electromatographs

Aug 7 + 8 1876

Fried E.M.G. had great trouble in getting anything at all through it even on short current, had point fine ⊽ this it dug in paper so deep upon pulling on pressure that it couldnt go back to point freely



We tried various papers (1st) pyro - acetate Ag & found but couldnt get anything that would stay adjusted for a second = We then flattened point the ⊽ when we could get it sometimes on ~~so~~ found & fairly on pyro =
After adjusting it on various ways we put great pressure

309

(10)

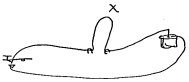
on pyro + open shunt ckt ~~got~~
1600 ohm got it good at 200,
when immediately put on phila
loop when we got it equally as
well at same speed, used 600 plain
shunt at harmonizing and
90 cells Cullard =
no shunt at receiving end
Sample at 200 words per
minute saved for scrap.
Book + well be on this date =
We after wards tried Alcohol &
Sol of Sodic Hydrate,
but results negative =
Got shape words either on
P or O. apparently equally
as well = We now try
1/2 pyro sol + 1/2 glycerine.

310

August 9 1896

Phenomenona

Last night I noticed something that I never saw before and is probably due to the action between the Battery Current & the Earth Current or magnetism



If with one cell of battery connected as shewn a portion of the wire is made into a loop as X either 1 or 2 feet high it will be deflected to one side on closing and by closing the key at the proper time with it vibrating time the loop can be made to attain a large swing 2 metres or more no matter how you place

311

the loop North South East or West
it will dip one way but if you
reverse the current it will
dip the other way.
I took great care that the
vibration of the key did not effect
this I held the key in the hand
with flexible cords. I also
took care that the wires were so
run that there were no parallel
wire whereby the loop could be
affected had them several
feet away. adding 100 ohms
killed the swing apparently.
By further experimenting found
that all other currents the
various commutating wires free
to swing were set in motion
slowly by opening & closing
the circuit.

312

Electromalagraph

August 9. 1876

Last night we had the most successful of all experiments with the EM.9 = Worked it through Phila Loop with 90 cell - first class without a false dot & perfect at 300 words per minute & it did not change its adjustment whether we went at 20 or 300 per minute also run to 600 per minute & got it good but occasionally there would be no breaks between a dash & dot. Shunted EM.9 with 1 spool of a WU 120 ohm relay & sending shunt 600 plain found that whole WU relay was not as good as 1/2 thus shunted the lever moved with great force at 300 so you

313

could ~~so~~ hear every det but of course Conduct read =
These results were attained by the use of a very strong solution of acetate of mercury, reduced to metallic state by Caustic Potash = the solution made night before was allowed to boil weak, we made a paint up pretty close = I remark here that a successful EMG paper must have an initial lubrication to prevent false vibrations & that is the reason why pyro — Caustic Soda — Sulphate Soda & acetate Hg or metallic Hg gave best results, because these are themselves lubricating material, We also found that with the acetate solution & at 300 per minute we had a considerable range of adjustment

314

We used considerable pressure.
Afterward tried it on a loop
to Albany & back 380 miles.
~~that~~ worked very fairly at 100,
pressure. Thought we had
two small batteries added =
30 cells Carbon making 1 Bat & 1 Bat
150 cells Calland = this
added improved
ment improved
it = ~~we got~~ put Will Relay in
series shunt didn't improve
much - Varied shunt = ~~it~~
~~was~~ Came 6 am when we
quit = are having lever
differed for Comm'ty =
& are in meantime trying
to wet paper with a Hg
Sol & letting roll dry &
are writing with a
reducing agent so as to
reduce the Hg to Metallic state
in paper which not mechanically
as previously ——— Aug 9 1876 Toledo

315

~~Slide~~ Electromedigraph

Evening of the 9th =
= 1st time used kind didn't appear cure any of the cuts
Split some patent leather soaked it
was 1/32 inch thick made a band
soaked it well in Carbolic & Acetate
of Hg Solution, put it on EM 9 & it
worked finely 300 words per minute
on philo loop =
afterwards it broke where it was
joined together, we then wet
some Acetate Hg ~~[illegible]~~ loop with
Carbolic. it didn't work, replaced
some of the roll used night before
containing a 1% solution & mechanical mixture
of Acetate Hg with 120. which
had become quite dry. EM 9 wkd
well. then took Acetate Hg (only) roll
placed it in a sol of Prot Chloride. This
reduced Hg to metallic state,
tried it on EM 9. it didn't worked
(replaced old roll wkd well). then we
took another similar roll
put it in Carbolic K ← to reduce Hg

316

+ that didnt work. we then made a Solution free from Mechanically mixed Acetate Hg. and put in KO, & wet paper alarming well in paper matter, This didnt work we dried a little paper + the wk belt but not good, We then made a Sol of Acetate Hg with some of the Sol mechanically mixed like the original Sol, + put in KO; This didnt work well in fact. it didnt work at all unless almost dried. We then Come to the Conclusion that Too much Caustic potash was used, However when we make some more paper a minimum quantity of KO + considerable quantity of Acetate Hg is to be used We are out of the latter today.

While using the ~~what~~ paper

317

left over from last night. We found that we could ~~[illegible]~~ repeat 300 permanent perfect, we could get perhaps 1000 if we had a good EMG because some of the words Ripple at that speed were perfect, We tried it direct, got at 17 wpm at 1000 words. We then mounted on line ~~[illegible]~~ 4 sheets on a Phelps Condenser. This wiped the Crump Entirely out & a chal auto pom. Showed nothing at all at any speed; We then mounted EMG when it repeated 300 perfect, & perhaps better than when in direct & hunted with a mag. This shows that the EMG is infinitely more sensitive than any sensitive Chemical pap

We had to mount 75 sheets of Condenser to get it readable on direct =

318

~~Forgot~~

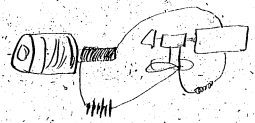
Phenomenona

We have noticed (Gill) that oil of Mustard softens + semi dissolves Hard Rubber.

It also gets under the finger nail painfully the end of the finger + separates in few hours the nail from the flesh so that you can see air space under neath the nail.

It does not touch Ivory = or bone or rather horn = at least not the form in 36 hours; + the latter in 3 hours;

319


4

320 Vol 8
Blake Edison
Oct 9, 1880

321 Vol 8
Blake E
Oct 9 - 1880

322 Vol 8
Blake E
Oct 9. 1888

[PHOTOCOPY]

Ej. J.S. EXHIBIT. 320-8.

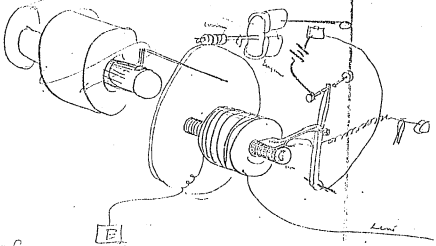
(Edison's Electromotograph Relay Aug 1879)

320-8.

C.L.G.

An idea

The idea has occurred to me that the EMG principle might be applied to an electro magnet. I took a Magnet Exhausted one coil by placing an armature upon it & by opening & closing the Key & passing along a flattened arm wire, the current produced by the friction caused by magnetization and demagnetization was apparent. I purpose to embody this principle in a machine as shown thus



[E]

Of course this is using current ~~[illegible]~~ but equally like the principle of the EMG

[PHOTOCOPY]

EDISON
EXHIBIT. 321-B.

working by difference of function, its the
example of increasing delicacy of
magnetic relays by working in a dual
circuit, when the end of the armature
is has a ring of wrong of-current
electrons to prevent the effect of
residual magnetism it will be
seen that the power with which
relay lever moves is always the
same; no addition or accumulation
of current [illegible] the adjustment
first-the prime, the dynamo
old in magnetic telegraphy
in electro mechanics

(Edison's Electromotographic Rely Aug. 1876)
T. A. E.

321-B

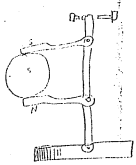
321

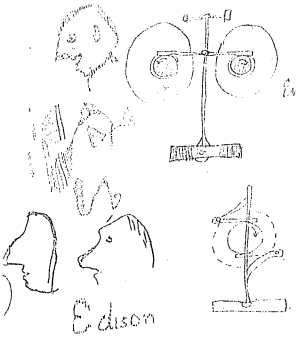
[PHOTOCOPY]

EDISONS EXHIBIT. 322-B.

322 - B

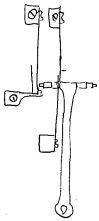
("Edisons Electromotograph Relay, Ca. 1876")
S. L. G.

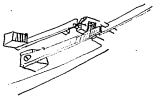


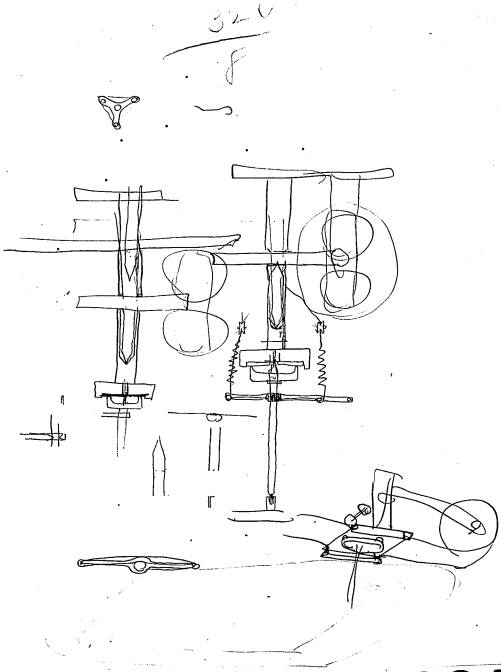


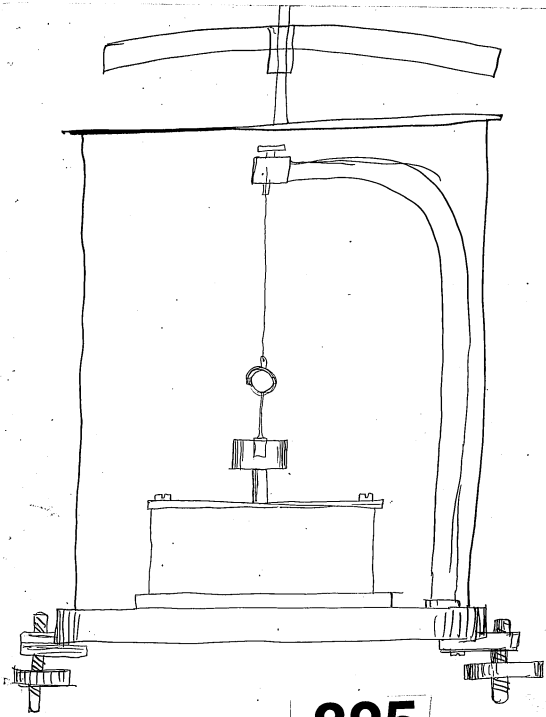
322

323
8









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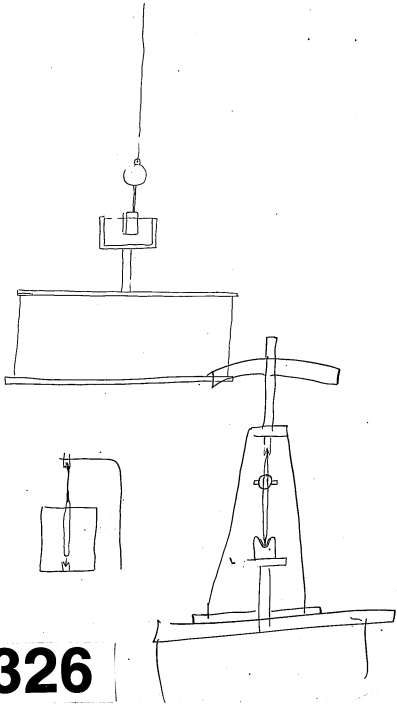
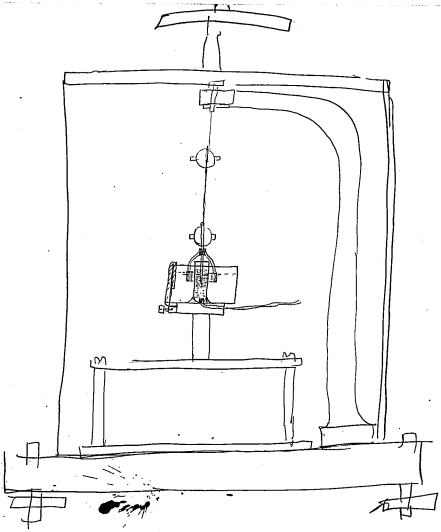


326

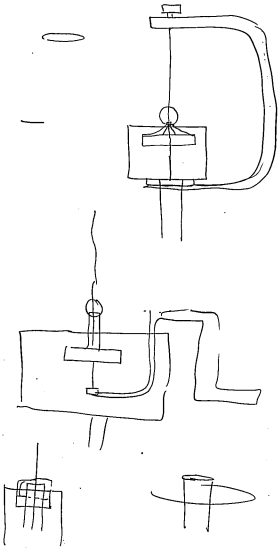


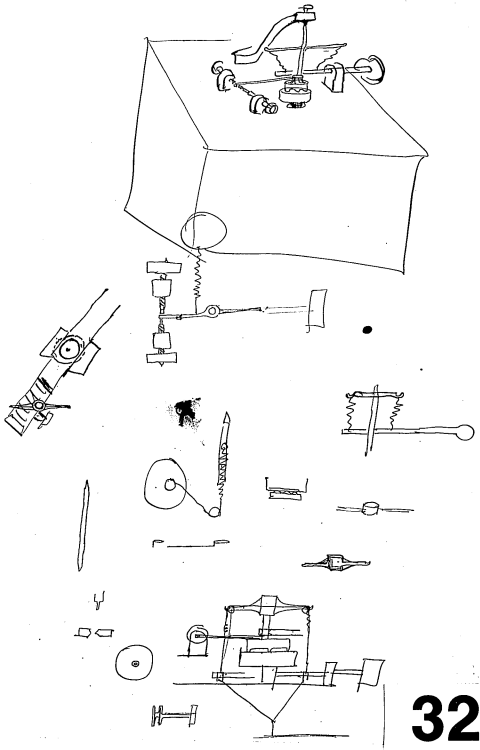
Electrolytometer

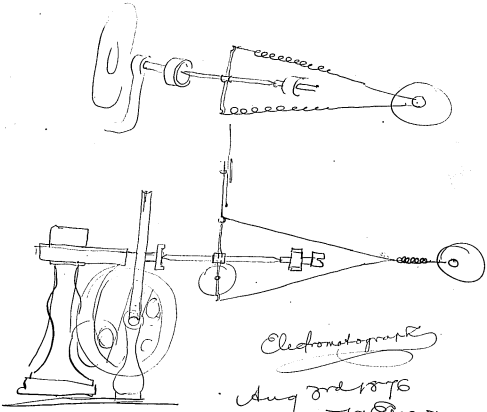
Efe

Chemical galvanometer

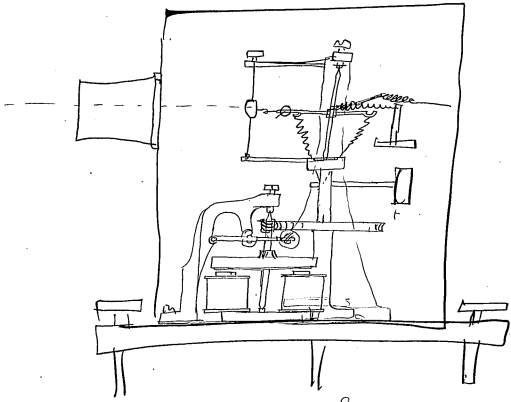
327






Electromotograph
Aug 3rd 1876
T A Edison
Thos A Edison
James Adams

330



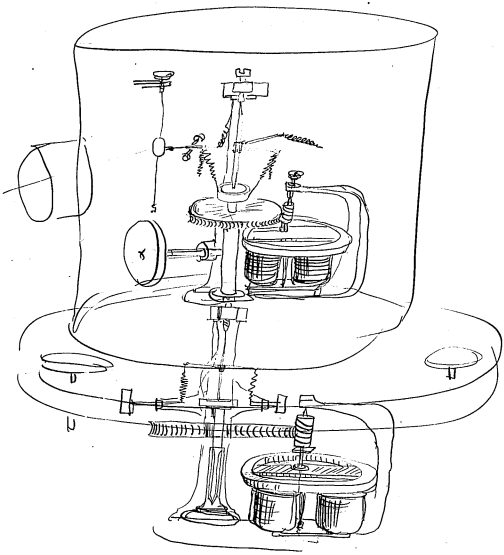
Electromotograph

Aug 3 1896

TAE

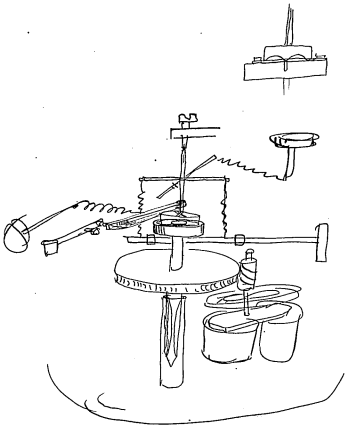
James Adams

331

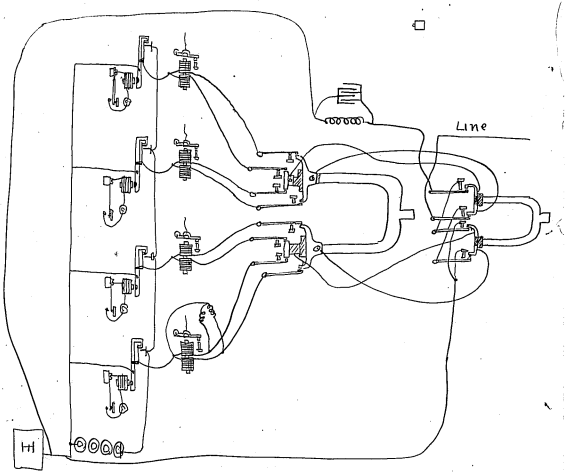


Delicate Electromotograph
Aug 3rd 1876
J. A. Edison

332

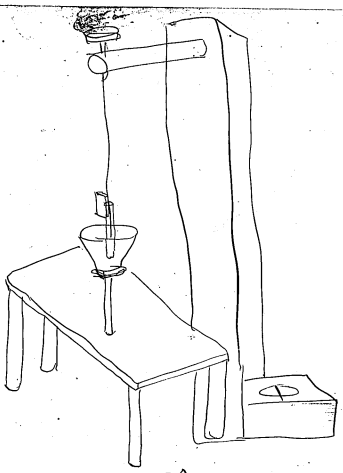


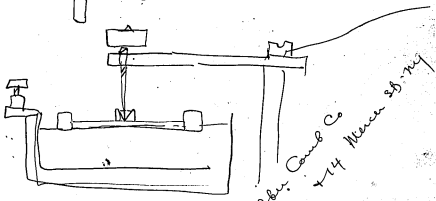
Witnessed by
[illegible]
Aug 3rd 1876



Aug 3rd 1876 Acoustic Transfer
Fred Gatchright on Duplexed making
Phila Coop Co 8 messages on one wire
[illegible]

334





Indian Rubber Comb Co
9 11 + 14 Mercer St. N.Y.

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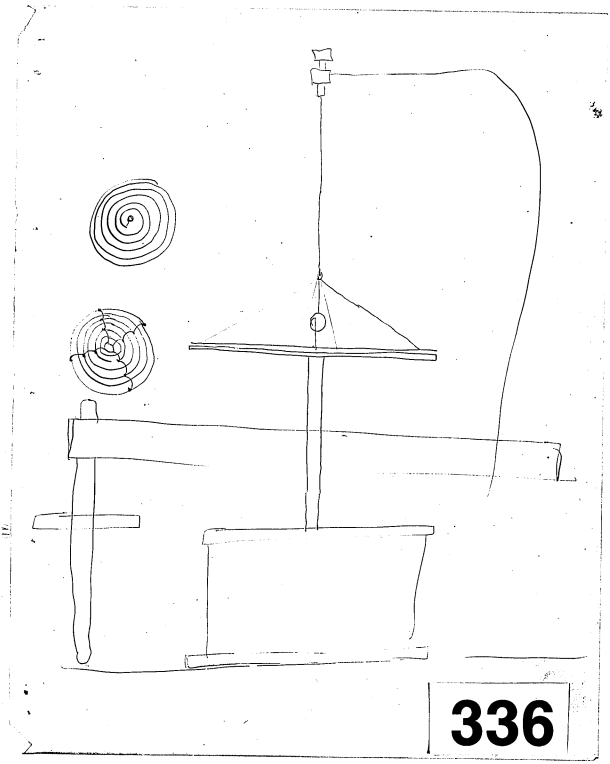

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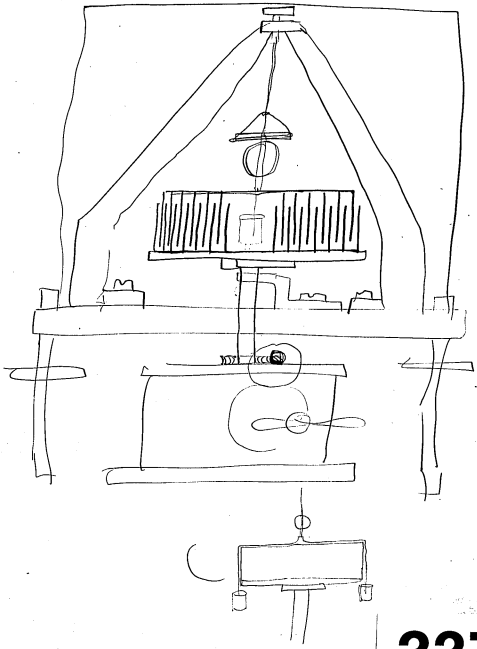

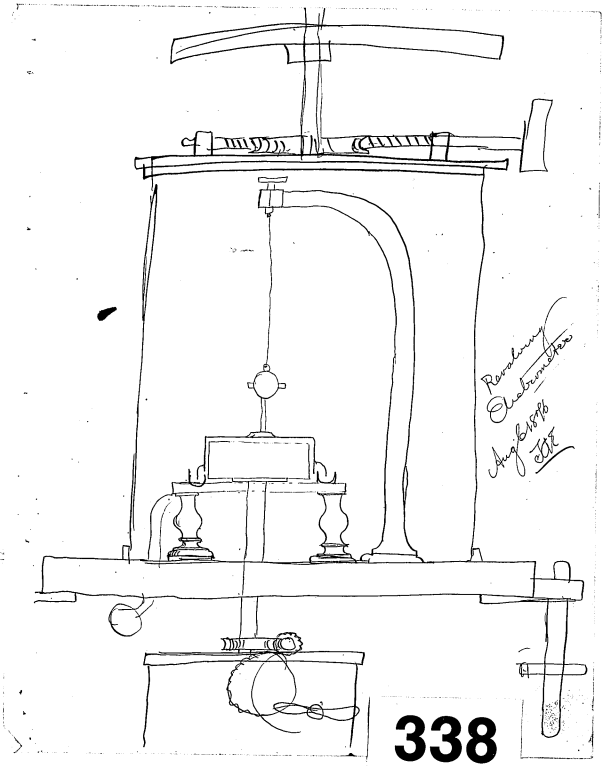

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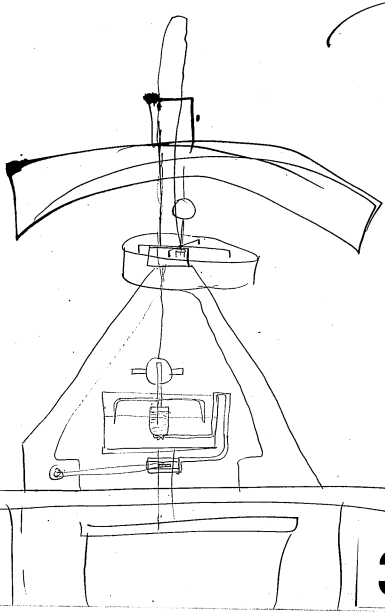
Chemical Galvanometer
Aug 6 1876
T A Edison



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Transcsactions of the Chemical Society

Bottomsmen Power
Power
twenty thousand
fourthousand eighty

Bathantine: air
Ale
Aigf
Aibe

Cibbe
Cabril
Cabil
Cabgf
Cabiff
Cabilfe
Cabule
Cabulf
Cabulfe
Cabungf
C

Electromalograph

August 10..

Circuit from Menlo to Boston & return 600 miles, We tried auto direct with 86 Collard +30 carbon – sending shunt low & all send if way – also shunt at receiving station, + best compensation, Sample 1. shews direct writing at 35, words per minute. ~~We~~ after much trying to get it better we inserted E.M.G. with quite dry acetate Hg + KO, poor some word on night of 8th = We got several words direct without shunting E.M.G. tried same on auto wet on local = wether mounted a Phelps Cender 40 sheets at E.M.G. with shunt of ~~600~~ 600 ohm at transmitting end no magnet No 2 is result at 75 words per minute. No 3 shews it without sending shunt same speed = with 32 sheet Sample 4 shews it at 200 words per minute

Sample 5 100 words minute 4 sheets Cond

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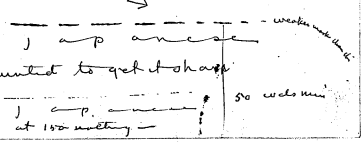
6 all the Condensers probably had bad adjustment -

No 7 on loop from Menlo to Phila thence to Boston + Return to Menlo 700 miles at 125 words per min 40 sheet Condr at recg station in line, + without sending shunt -

These experiments confirm those made last winter on the artificial Buffalo Ckt — do —

No 8 16 sheet 100 w minute - great pressure - 700 miles

With 2½ lb to gal ~~paper~~ Iodide Pot paper ~~the~~ with starch the most sensitive can make. Can get it by shunting at recg end with magnet so as to record it at 50 to 75 thou



no sending ohmit, by disconnecting
magnetic compensation & weakening Cards
at recy end no sending ohmit. 4 sheet ohmit
show a dot 16 nothing 32 nothing
40 just came so that maximum of a dash
would show. 90 sheet got it
40 words. Thus unsounding ohmit
with it get nothing readish owing to weakening
of the J. cap amplifier

it was much faster than this,
yet the EMG on 16 sheets
with very dry paper affording of
itself high resistance repeated
some words perfectly at 200 words
per minute. see sample 1 2 3 4
, 5 6, 7 8

Closed 5 am

T A Edison
Adm
Johnson

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Hand Motograph

Continuation of experiment of Aug 4, 5 or 6th with the High resi flunds through 70,000 ohms 6 cells Carbon with pen engine indicating a Reciprocating sounder + key to stop + start vibrations,

Best Standard on test was I believe,
Alcohol + Nitrate of Uranium,

I now get the adjustment so to speak of the delicacy of the best solution yet found (14) the above, standard =

70,000 ohms standard good

Alcohol- Cupric Chloride not up to Standard
" Oxalate Cerium as good as that

Better than standard on H with Tin + Zinc only a tri best,

Alcohol Lactate Zinc not up to Standard,

Can feel it only on Silver = H,
zincate plumb = prbly not so good as standard

344

Alcohol + Sandalwood,
apparently ~~marked~~ friction on skin (very
drying) strong. Phenomenal.

Alcohol + Valerianate of Zinc. I think I feel it

Alcohol + Acetate Manganese.
Best compare with 4 Standard 5 Atelan.
pressure was very strong

Alcohol + Acetate Cobalt Phenom
not good as Em. 9 but when they open
feel as if dots came or you were
drawing pen along as on a 1000 ruling
there is a great sense of friction =

Alcohol + Protochl Tin can just feel it
when normally wet great normal friction

Alcohol + Acetate Lime - just feel =
Alcohol + Ammoniac Tears - doubtful if feeling
" Iodide Hg - "

Alcohol & Cadmium Chloride = Phenomena

with very light pressure & on tip get the dot faintly
with great pressure & very flat of platinum
get a great deal of friction on closing
key - but not sharp feel like the charge &
discharge of a Cable =

Alcohol & Benzoate ammonia just feel with pressure
apparently get dots when sounder lower down
(repeat back point) and these dots are apparently
increased by on its repeating on air
Can't be ~~that~~ ~~these~~ these
are residual vibrations or after vibrations

Alcohol & Cuban Trichloride = doubtful if feel

Alcohol & Gum Sandarac Doubtful if feel.
Do & Sulphite of Ammonia " "
Do & Chloride " Nickel Just Feel if -
Do & Nitrate " Magnesia 1st Class. Need is not little
than No. 5 Standard
Note Compare = Shows best
on tin - Worst Stand heavy
Pressure -

Do & Bi-chloride of Mercury
On N. apparently increases
friction with Nickel -

a book

"Iodide of Iron apparently get nothing
Do & Sulpho Carb. Sodo. Doubtful if feel -
Do & Iodide of ~~Potassium~~ - As good as 5 Standard
On aluminum nickel & zinc
Weak point

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Phenomenon! Aug 12-1876

Exceedingly plain & sharp on Lead!

When point is used - Dont show well

When flat is used -

Use of Sulphate of Aniline - nothing -

Do & Salicine nothing

Do & Iodide of Lead - Just feel it

Do & Cocoa Butter Feel it quite plain when fresh

Try this in some other menstrum

Do & Gum Benzoine Apparently nothing

Do & Grape Sugar Nothing

Do & Acetate - - - - - Nothing

Do & Chloride of Potash - - Nothing

Do & Lactate Acid - - - - - Nothing

Do & Butter of Antimony - Nothing

Do & Sulphate - - - Quite plain on Copper only

Do & Lactate of Bismuth - Nothing

Do & Chloride of Lime Nothing

Do & Formate of Soda - probably better than the Standard on Lead - Sharp - light Pressure - Even when paper wet dry

C!

Do & Shellac - Feel it slightly

Do & Gum Hemlock nothing

~~Dot~~ Mirbane & Flower of Soda - Just feel Paper Blacks Iron & Copper probably a sulphide

Iodid of Potassium & Water - Nothing

Neats Foot Oil & Turpentine Nothing

Oil Sassafras - alcohol - & Rum Nothing

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Aug 12th 1876

Cocoa Butter & Water —

Phenomenon!

Quite strong - but prominent on Oxygen with Aluminum light pressure

This working on Oxygen may be attributable to changing the menstrum -

Co. Butter - rubbed on Paper with Water
Nothing on Hydrogen -
Friction increased quite strong on Oxygen with Aluminum - Others not so apparent —

Do. Do. Heavier Buttering -
Too much of a good thing - Delicacy decreased —

Do Do with Salt for Conductivity
No Improvement

Edison

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Menlo Aug 17th 1876 –

Electro Motograph.

Experimenting on different Porous substances to replace Paper in the Essay. –

Found Black Lead – very absorbant – Lump Blk Lead – Pyro Gallic solution – Good results – but difficult to keep moist – admits too free passage of current – dont give time for decom. of solution – Gets soft on surface – Powdered & rubbed on metal gives better results.

Chalk & Pyro Gallic –

As good as Paper – Good conductor, at same time admits of Motograph action Holding solution well – Chalk not being of itself a conductor – allows the solution to perform that function alone –

349

Licorice & Pyro Gallic -
Licorice kept & rubbed on the Drum
- when, nearly dry is quite good

Note If is Evident the Electro Motive
Action - is due entirely to the
Solution - & only requires a
Solid, to hold it.

Cork - Pyro Gallic.
Pyro Gallic on surface gives
Conductivity - but no E.M.F. action

Gum Tragacanth - Pyro Gallic
No result - Except Conductivity

Grape Sugar - Pyro Gallic -
No Good

Sal. Ammoniac - Pyro Gallic
No Good

Soap Stone - Pyro Gallic
Made into Paste - No Good

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Carbonate of Ammonia. Pyro Gallic
Work well with good Pressure
- but dissolves quickly in the solution

Borax - Pyro Gallic -
"Afraid its a failure"?

Camphor - Pyro Gallic -
Sticks

Note - It continues to be apparent
that Surface Conduction dont
give E.M.G. action - The action
would seem to be direct through
the substance

Paste of Paris Pyro Gallic
thin layer - mixed with Pyro Gallic
Excellent
Good Conductor. Good E.M.G. action

Pine Wood. Pyro Gallic
Very good – Will try again
When more thoroughly wet.

Tried it again – about Same

Chalk is Best so far

Edison

August 18 1876.

Electromagnetic =

Have been making a large number of Compounds of Iodides of Pan HO & other things such as Phosphate of Iron, Chalk, Litharge Etc to ascertain whether the best substance to make strokes off for the ~~work~~ E.M.G. We having ascertained that. the action is entirely due to the decomposition of the fluid

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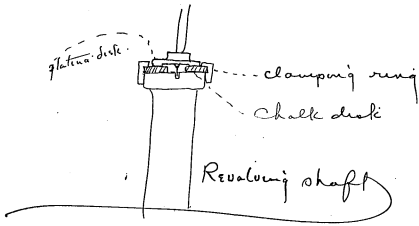
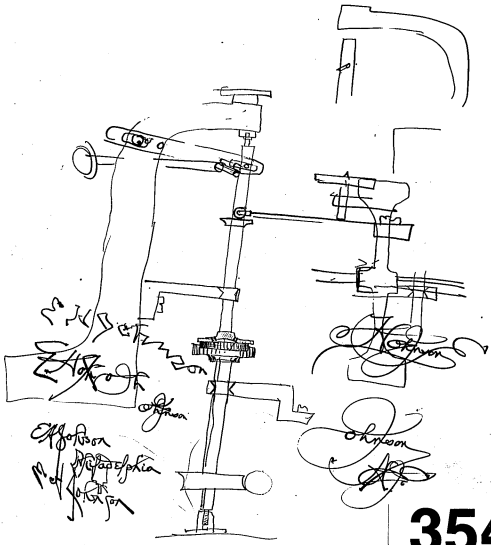
These will not be dry ~~f~~ until Tomorrow = Had to with fix the Ebb from a three point tripod (which was a failure owing to want of proper substance ~~f~~ would be solution) to a disk, thus

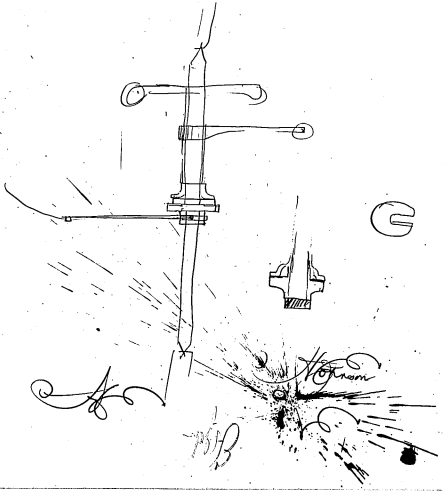


We put on a washer turned from Natural Chalk, which had hardly been wet (with pyrogallic), when we found that the Mechanical Vibrating action had Ceased and that apparently one of the main abutments had been removed = by

Remarcatining. and increasing friction spring found that it

Repeated at about 100. per min 5000 ohm 20 cell battery perfect




A
B
C
Nothem

EMq Aug 18 1896.

With the new EMq & Chalk pyroqallic we recd hundreds of volts over loop to Phila = at rate of 200 per minute Very not perfect notwithstanding that the shaft run out, We are going to have the shafts all put in clockwork Centers to get rid of shake.

August 21 1896 -

Experiment with EMq Solution holding & Solution;
2 cells old Carbon 20000 ohm; Carbonic Soda best - Phila
Pyro & Can K not so good as
Soda = Alcohol & Nitrate Urin

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fair = fearful measure fraction in O,

Kaolin no good on NaOH or pyro,

plaster not good =

1 Chalk & Glycerine 20 grm 100 ! O - no good on 40 000 ohms.

2 Chalk & 5 grm ~~[illegible]~~ Shellac 1 grm KO, 100 cc C_2H_5O, no good =

3 5 grm Balsam Tolu. 1 grm KO - mix

4 Phosphate P. & Acetate Hg in solution one good = paper soaked in NaO, no better - ~~[illegible]~~

We now test with 60 000 ohm Metallic & 1 small Water R ~~[illegible]~~ with 1 cell old Carbon = Carbon Jar in Chalk gives it weak but plain. I standardize this = & Canadian Company also other hand with a paper I have on EMG.

357

4 = Acetate Nickel 10 gm 100 cc H_2O
not up to standard feel nothing
on the 60000 ratio Rheostat 1 cell.

I now go back to 60000 ohm as my standard pair appears to weaken.

5 ~~Acetate~~ Manganate of Soda 20 gm 100 cc H_2O N.G.

6 Iodide Pot. ~~PT~~ Chalk dont feel

Citrate of Potash, + Plaster dont feel on H but friction greatly increased on O, and this friction is apparently stronger than like. Can Soda slip on H on my standard pair it appears to act rather quicker than the general run of measured friction

7. Iodide Iron 20 gm 100 cc H_2O, ~~not~~ dont feel anything

358

8 Acetate Uranium 14 grains - not fully =

Phosphate KO. 20 grains 100 cc H2O N.G.

20 grains Tartrate Soda N.G.

found that ~~add to~~ my old slantard
pain weekend off - found
two bottles reversed solution
in bottle when it came off on
60000 obs. which I now use

100 ccs.
1 grain Glycerotrione - N.G. ~~H2O~~

No 10 -

20 grains Arsenate of Soda
100 CC H2O - - - - - N.G.

No 11 -

40 grains. G. of Potassium 100 cc H2O.
No 12 N. G.

48 grains Ferrid G. Potassi 100 cc H2O
N.G.

No 13. Metallic Sodium laid on Empty Platina Pan Drawn across it N.G.
Platina Pan fastened to Sodium & Dr Drawn over Standard Caustic Soda Piece — N.G.
Took a little Mercury - Put it in Shallow dish - put Sodium Piece in it - result - quite a devil's Agitation on the Surface of the Mercury — Short Circuited the one cell — put one Pole in the mercury - Touched the other to the Sodium When there was an Instantaneous Explosion - the major part of the whole becoming a tough Solid substance — N.G.

No 14 20 Grams. Potassic Hydrate 100 cc H.O. N.G.

No 15 = 20 Gr. Chromate Soda - 100 c.c. H.O. N.G.

16. 10 G. Tannic Acid - 100 cc H.O. N.G.

17. 40 Grams. Nitrate Strontia 100 cc H.O. Poor -

18. Nitrate Magnesia Alcohol - Excellent

19. Sulphate Cobt. Amis. 100 cc H.O. - N.G.

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20 1 Gr. Mor. of Lead - 100 cc H.O. N. G.
21 Gelate of Cerium Alcohol - N. G.
22. Formate of Soda - Do - N. G.
23. Nitro Prusside Soda 100 cc H.O. T. G.

Note Caustic Soda - Standard Piece

On Oxygen 1st closure no other Immediate friction Not disappearing for several seconds - Date cannot be felt - After Pen has ceased discharge Cell may be Broken, & closed again without any change having taken place - It appears to roughen the Platinum =

24. 1 Gr Aloin - 100 cc H.O. N. G.
25 1 " Pyro Gallic. 100 cc H.O. N. G.
26. 20 " Sulphate of Indigo. 100 cc H.O. - N. G.
27. 20 " Permanganate of Sodium 100 cc H.O. - N. G.
28. Concentrated Solution - Pyro. & Caustic Soda - N. G.
29. Nitric Acid - - - - - - N. G.
30. Tungstate of Soda. Water - - - - - N. G.
31 " & Caustic Soda " Tried again - when dry - quite good N. G.
32. 40 Gr. Glycerine & Salt - - - - N. G.

Note Caustic Soda -

By taking advantage of decrease of friction on Oxygen - in using reverse Current - I get splendid action - because the normal friction is largely increased by the action of the Current

33. 1 qr. Valerianate Magnesia 100 c.c. H.O. N. G.

Note Plaster Paris. 3rd Caustic Soda. N. G. But it may when Dry - will try again

Edison

Exactly

Experiments to determine the best proportion of Caustic Soda with Water for delicacy & sharpness & power.

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New Form. Gravity Batty.
Aug. 22d/76 —

No 1 —

Glass Jar - Carbon sing
Zinc - Small Wt Gravity
Carbon - Powder'd about 1/4 Pint
Sulph Copper (Blue Stone) - 1 lb —
10 Ann Marks 6 oz —

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